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Impact of health financing policies in Cambodia: A 20 year experience

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ABSTRACT

Improving financial access to services is an essential part of extending universal health coverage in low resource settings. In Cambodia, high out of pocket spending and low levels of utilisation have impeded the expansion of coverage and improvement in health outcomes. For twenty years a series of health financing policies have focused on mitigating costs to increase access particularly by vulnerable groups. Demand side financing policies including health equity funds, vouchers and community health insurance have been complemented by supply side measures to improve service delivery incentives through contracting.

Multiple rounds of the Cambodia Socio-Economic Survey are used to investigate the impact of financing policies on health service utilisation and out of pocket payments both over time using commune panel data from 1997 to 2011 and across groups using individual data from 2004 and 2009. Policy combinations including areas with multiple interventions were examined against controls using difference-in-difference and panel estimation.

Widespread roll-out of financing policies combined with user charge formalisation has led to a general reduction in health spending by the poor. Equity funds are associated with a reduction in out of pocket payments although the effect of donor schemes is larger than those financed by government. Vouchers, which are aimed only at reproductive health services, has a more modest impact that is enhanced when combined with other schemes. At the aggregate level changes are less pronounced although there is evidence that policies take a number of years to have substantial effect.

Health financing policies and the supportive systems that they require provide a foundation for more radical extension of coverage already envisaged by a proposed social insurance system. A policy challenge is how disparate mechanisms can be integrated to ensure that vulnerable groups remain protected.

1. Introduction

Improving financial access to services is an essential part of extending universal health coverage (UHC) in low resource settings. Strategies typically incorporate a number of elements including boosting overall funding, increasing the proportion of funding channelled through pooled funding (particularly publicly funded insurance mechanisms), diverting spending to services known to be effective and ensuring equitable financial access (Moreno-Serra and Smith, 2012; Kutzin, 2013).

Development of UHC in Cambodia requires action across each of these elements. Although total spending on health care at around 6% of GDP (World Development Indicators, databank.worldbank.org/) in Cambodia is about average by South-East Asian standards, much of this is un-pooled spending on medicines and other private services. Public funding remains at around 20% of total funding on health and penetration of private insurance is low. Contact with the formal health sector remains low (around 0.5 visits per capita), reflected until recently in the limited use of essential services such as skilled delivery care: until around 2010 only around half women attended a health facility, although the latest DHS shows an increase to 80% (National Institute of Statistics DGfH, 2015).

In recent years, health financing policy has focused on reducing the barriers to utilising services particularly amongst the most vulnerable. Ultimately the intention is to develop a comprehensive

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system of social protection based on social health insurance. Current policy in Cambodia attempts to ameliorate the effects of financial barriers to service access by targeting resources at "the poor and groups with special needs" (Government of Cambodia, 2013). Policies implemented include formal user fee exemptions, health equity funds run by government and development partners, vouchers and community based health insurance. Impact and qualitative studies suggest they have a generally positive impact on access to services particularly by the poor including: equity funds (Flores et al., 2013; Noirhomme et al., 2007a; Dingle et al., 2013) and vouchers (Ir et al., 2010; Poel et al., 2014) and performance funding (Soeters and Griffiths, 2003a; Van de Poel et al., 2015). Using data from the Cambodia Socio-Economic Survey, we add to this evidence by: 1) examining how the initial decision to formalise user fees affected spending; 2) how the effect of policies have built up over time; 3) how interactions between policies magnify or diminish the impact of policies. Following previous studies, we utilise the gradual roll out of policies across the country to facilitate a comparison between the policy effect on individuals in intervention areas and similar individuals in control areas. By reviewing evidence from other studies combined with a consideration of the impact of all main policies using a regularly collected dataset, we provide a consolidated overview of the main financing changes over the last 20 years.

The article is arranged as follows. In the next section we describe the evolution of health financing policies in Cambodia. This is followed by a description of the methods and data used to assess the impact of policies and policy combinations on both use of public health services and health spending per capita. Results are then described followed by a discussion of these in the context of policy goals and in comparison to findings of other studies.

1.1. Health financing policies in Cambodia

A series of health financing policies designed to improve financial access to health services, particularly amongst the poor, have been rolled out across the country since 1996 (Table 1). Initially these had the intention of bringing greater transparency and more stable funding to the public health system. Latterly they have addressed the low use of services, particularly amongst the poor.

Much of the evidence on the impact of user fees is based on case studies of districts and individual facilities combined with cross sectional analysis of the impact of charging on health seeking behaviours. There is some evidence that formalisation when implemented with clear rules, strong management and waivers for the poor can reduce unpredictability over payment and increase utilisation of services (James et al., 2006). User fees bring funding into a facility that can be used flexibly to improve services including incentives to staff. A positive impact on utilisation was reported by early case studies in Takeo district and a maternal care referral facility (Barber et al., 2004; Akashi et al., 2004). There is also considerable evidence of the negative impact of user fees. Qualitative studies found that exemption rates for health services have often been low, applied haphazardly and benefited those with connections to staff rather than the most vulnerable (Khun and Manderson, 2008). It is suggested that formalisation has contributed to increased levels of health spending which often lead to accumulated household debt following episodes of ill health (Van Damme et al., 2004; Health Economics Task Force, 2000). Fees may initially have caused patients to seek services in private rather than public facilities which later encouraged an increase in the price charged in the private sector (Jacobs and Price, 2004).

To mitigate the rising cost of care use of services particularly amongst the poor, the government with support and advice from international agencies has introduced a series of financing mechanisms. The need for these mechanisms is motivated by the formalisation of user fees. Arguably these other mechanisms can only be made to work once unofficial fees have been eliminated.

The mechanism that has had greatest coverage is the health equity fund (HEF) mechanism which was introduced with financial support from development partners and technical support from international NGOs from 2000. By 2009, the population of almost 50% of communes was covered by an NGO or Government financed equity fund. HEFs are held by facilities and contribute to the costs of treatment, transportation and food for patients and carers. Most early research produced case studies of schemes in particular areas.

Table 1
Health financing policy roll out in Cambodia.

Year of Implementation	Details	Communes included						
		1997	1999	2004	2007	2009	2011	% of total by 2011
1996	User fees: Fees are set by facility committee and approved by Ministry of Health; 99% of revenue is retained in facility; facilities must establish exemption policy for the poor; some high priority services should be provided without charge.	38	195	867	1325	1395	1357	84%
1998	CBHI: This is a not-for-profit, voluntary insurance scheme selling low-cost policies to community members. The insured and family are entitled to use defined health services at contracted public health facilities. CBHI reimburses the cost of services consumed by its members.	0	1	12	70	140	310	19%
1999	Contracting: This includes contracting-in, contracting-out, and special operating agency arrangements within the health sector aimed at delivering a range of different clinical and support services, including cleaning, catering and management.	0	100	279	256	164	565	35%
2000	Health Equity Funds (Donor-funded): A social-transfer mechanism designed to remove financial access barriers to public health facilities received by the poor through reimbursement of fees from a third-party payer, mainly local NGOs. Pre- or post-identification are used to identify those who are entitled to get health free services at the point of use. The third party reimburses the cost of such services to facilities on a monthly basis.	0	1	74	146	586	482	30%
2007	Voucher schemes: Vouchers given to pregnant women to cover 2–4 ANC visits, delivery and post-natal care, transportation costs and fees for referral to hospital. Some schemes are universal and some target only poor women.	0	0	0	54	345	545	34%
2008	Health Equity Funds (Government-funded): A Government funded subsidy whereby public health facilities provide services free of charge to poor patients financed through a transfer from the national budget. The schemes are managed directly by operational districts (ODs) and Hospitals.	0	0	0	0	210	259	16%

These suggested that HEFs have been an effective way of stimulating use of hospital services by the poor although barriers to access remain (Noirhomme et al., 2007a; Hardeman et al., 2004).

Impact evaluations suggest that health equity funds have improved access to health services of the poor (Hardeman et al., 2004), reduced out-of-pocket spending and household health related debt (Flores et al., 2013), and increased public health facilities utilization (Noirhomme et al., 2007b). There remain concerns that HEFs may not be sustainable in the long-run (Tangcharoensathien et al., 2011).

While HEFs have largely been viewed as a way of funding care for the poor, some authors emphasise the role of funds in improving the type of care provided through more careful purchasing of services on behalf of patients and their role in quality improvement through selective contracting (Bigdeli and Annear, 2009). Conversely, there is concern that while HEFs are important in stimulating demand, care is needed to ensure that the supply of services is adequate (Ir et al., 2010); an issue raised about demand-side interventions more generally (Murray et al., 2014). Evidence suggests that inequalities in health status and access to services have declined in recent years. Several studies suggest that equity funds and vouchers have contributed to this improvement (Dingle et al., 2013; Liljestrand and Sambath, 2012). Their effect is, however, difficult to disentangle from the effects of investment in service delivery and general improvements in socio-economic status.

Health equity funds are designed to mitigate facility costs once at a hospital but have less impact on the sometimes substantial demand-side costs of using services (although some can be used for transportation costs, the cash is still not available until a patient is at a facility). Vouchers, introduced from 2007, are complementary to equity funds since they provide incentives to access lower levels of the health system and address non-facility financial barriers to care (Ir et al., 2010). Vouchers cover costs of family planning, antenatal, delivery and postnatal care and also provide reimbursement for transport to reach the facility for these services (Brody et al., 2013). Government and non-government facilities must be accredited by the programme in order to receive reimbursement which may stimulate competition to improve quality and expand choice to patients. Some voucher schemes are targeted at the poor while in other cases all are entitled to benefit. Qualitative studies suggest that the voucher programme is popular because it provides a guarantee of reimbursement including covering transportation costs (Brody et al., 2013). Unsurprisingly in an environment replete with alternative financing mechanisms an important factor discouraging voucher use was the confusion with other programmes as well as the precise procedure for qualifying.

Pooling DHS data for 2005 and 2010, Poel at al undertake a difference-in-difference comparison of the impact of vouchers on use of antenatal and delivery care (Poel et al., 2014). After controlling for household confounding factors, they find that use of vouchers is associated with a 10% increase in delivery care, a 5.3% increase in post-natal care but no impact on antenatal care. The effect is greater for the poorest households. Universal schemes appear to have a larger effect on facility delivery than those that are targeted.

Community Based Health Insurance (CBHI) was introduced in the mid-1990s to provide low cost insurance for poorer families. Schemes remain voluntary and cover less than 10% of communes. To provide universal coverage to wage earners employed in the formal sector, a Master Plan for Social Health Insurance (SHI) was introduced in 2005 but was not due to start operation until 2015 (Ly, 2011).

Performance based financing initiatives have been a central part of attempts to improve the delivery of health services. These have been implemented through the use of contracting models that permit health facilities to manage resources and receive funding in a way that is distinct from the government's line budgeting system. Some operational districts were given pilot contracting status from 1999 through a process either of contracting-out, whereby an NGO was given full autonomy to control staff numbers, or contracting-in, which limits the autonomy to control over non staffing inputs and organisation of services within the facility. Since 2009, the Government of Cambodia has incorporated a form of internal contracting into selected health districts known as Special Operating Agency (SOAs) which deliver services under contract to provincial health departments. Case studies have focused on the positive impact of contracting on quality of services and overall service coverage including the proportion of fully immunised children (Schwartz and Bhushan, 2004; Soeters and Griffiths, 2003b). A quasi-experimental study, utilising three rounds of the Demographic Health Survey to investigate the impact of contacting on use of reproductive health services, found that households in areas that have contracted facilities are 25% more likely to have a facility delivery (Van de Poel et al., 2015).

The large number of different financing mechanisms often coexisting in the same areas makes it difficult to disentangle their individual effects. Indeed the overlap is often deliberate since aspects of one mechanism are meant to enhance or complement those of another. Vouchers, for example, enhance the effect of equity funds by covering demand side costs and services below hospital level. Early contracting pilots developed mechanisms formalising user fees (Soeters and Griffiths, 2003b). Supply-side incentives to practitioners further enhance the effect of demand-side mechanisms. One study demonstrates the much greater combined impact of equity funds, vouchers and delivery incentives compared to incentives alone (Ir et al., 2010). Any assessment of the overall impact of these schemes needs to take account of the overlapping and interacting nature of many of them.

2. Methods

The gradual extension of financing policies across the country allows an evaluation of the impact of the policies on household spending on health care. We make use of data from the Cambodia Socio Economic Survey (CSES) from 1997 to 2011. Changes in sampling design, survey method and questions asked mean that the surveys are not all easily comparable. Surveys in 2007, 2008, 2010 and 2011 were smaller and covered fewer topics than in 2004 and 2009 which limits the range of variables that can be used. This renders individual level analysis across surveys difficult but still permits commune level analysis.

The data are used in two ways. Firstly, we pool information on household behaviour at the commune level to generate an aggregate commune panel data set from 1997 to 2011. This is used to look at aggregate effects on household health spending across the entire time period allowing an investigation of the lagged or build–up effect of the policy to be captured. Secondly, we focus on the impact of policies and policy combinations at the individual household level using the 2004 and 2009 cross-sections of the CSES.

For the panel analysis we look at the impact of the main individual policies - user fees, health equity funds (donor and government), vouchers and CBHI – on average household health spending (E_{tc}). A mixed effects multilevel model is estimated allowing commune variables to have fixed and random effects across areas as follows:

$$E_{tc} = \beta + \beta_1 t + \sum \beta'_p \pi^p_c + \sum \beta''_p \overline{\pi}^p_{tc} + \sum \beta'''_p \overline{\overline{\pi}}^{pz}_{tc} + \alpha_4 Z_{tc} + u_c + u_d + z_{tc}$$

where for commune c, t is a time trend (1997 = 1), π^p_c is a dummy variable where the policy p is implemented sometime during the

time period and $\overline{\pi}_{tc}^{p}$ is a dummy variable for the time period in which policy p is implemented, Z_{tc} is a vector of characteristics of households in the commune, u_d *and* u_c are district and commune specific random-intercepts and z_{tc} is a commune error term. Since we expect that the impact of policies may build-up over time we also specify a variable, $\overline{\overline{\pi}}_{tc}^{pz}$, equal to the number of time periods after the policy is implemented in that area. Data were merged for all eight CSES between 1997 and 2011 and covariates aggregated at the commune level and merged with information on the year of implementation of each policy in each commune.

The cross-sectional household analysis examines the impact of each policy in more depth taking into account policy combinations to recognise that these interactions are likely to affect the overall impact of individual policies. Difference-in-difference is used to compare the impact on individuals in intervention areas with individuals in comparison areas (where none of the policies had been introduced by the end of 2009) adjusting for household, individual and area covariates. Eight policy combinations are examined between 2004 and 2009:

1. Control (no policy)
2. User fees only
3. User fees with vouchers
4. User fees within contracting areas
5. User fees with HEFs financed by donors
6. User fees with HEFs financed by government
7. User fees with vouchers
8. User fees with vouchers and Government HEF
9. User fees with vouchers and Donor HEF

Official user fees are regarded as an essential precursor to all the policies since they provide a formalised arrangement for understanding how much facilities charge and so set the size of subsidies from each source.

The data sets contained an inadequate number of CBHI areas and so we were not able to analyse the impact of this policy so these areas are dropped from our sample. We do not believe that this will substantially bias the analysis. CBHI communes are in most respects similar to the remaining communes (household structure, age, sex, urbanisation) although CBHI households appear to be slightly (7%) wealthier as measured by total consumption. The policy impact equation is defined as:

$$Y_i = \alpha_0 + \alpha_1 t + \sum \alpha'_p \Pi_p + \sum \alpha''_p \Pi_p * t + \alpha_3 X_i + \alpha_4 Z_i + \varepsilon_i$$

where t is a time dummy (2009 = 1), Π_p is a dummy variable for each of the eight policy (p) combinations, X a vector of household covariates, Z a vector of community covariates, and ε is an error term. The coefficient α_3^p estimates the difference-in-difference effect of each individual policy. Standard errors are adjusted for commune and district level cluster effects.

Two outcomes are examined: the probability of seeking medical treatment in a public and private facility if sick; and the level of out of pocket spending per household during the previous month. Out of pocket spending includes both payment made at the facility, medications and transport to and from a facility. The first outcome is a bivariate variable and a probit model is used. Public facilities include public hospitals and health centres. Private facilities are private hospitals, clinics and pharmacies/drug stores. In the case of the second outcome, the large number of households reporting zero spending is likely to render continuous variable estimation, such as ordinary least squares, biased. Instead we estimate a two part-model: first the discrete decision whether health spending is non-zero using probit estimation; second, a generalised linear model (GLM) for households reporting non-zero spending (incorporating a log-link function and gamma error distribution). Marginal effects estimate the overall treatment effect on those exposed to each policy.

Most of the financing policies are designed to focus mainly on the poor. The Cambodian Ministry of Planning uses a standardised procedure to identify poor households known as the IDPoor. This is based on quality of housing condition; the quantity of the house floor's size, agricultural land, fishing equipment, livestock, durable assets, the means of transportation, dependent family members and other information, as well as the general perception of the village representative group. Although complete information to replicate the IDPoor means test is not available we constructed a wealth index which aggregates the majority of the assets into a single variable using Principal Component Analysis (PCA).

Data to estimate the impact of policy was drawn from the 2004 and 2009 Cambodia Socio-Economic Survey (CSES). Since we wish to compare the effect of policy implemented at district level on individuals, we include in the analysis only the clusters that are common between these two surveys. In addition, we also excluded households sampled in November and December 2003, as well as January 2005 from the CSES 2003/04 to ensure that the timing and duration of sampling in the field is equivalent (Table 2).

3. Results

Summary statistics from the CSES suggest that household spending increased five-fold in real terms (2005 prices) between 1997 and 2009 and much faster than incomes (Fig. 1) while the proportion of income devoted to health care increased from 2% to almost 10%. For the richest, the share of income devoted to health care was fairly stable over the period but it increased substantially for the poorest so that by 2009 spending accounted for more than 11% of their total consumption. Since 2009 spending both in

Table 2
Households included in study by policy type.

	2004		2009		Total	
	Individuals	Communes	Individuals	Communes	Individuals	Communes
Control	653	31	528	31	1181	62
User charges	660	30	1627	93	2287	123
UC + vouchers	350	17	707	37	1057	54
UC + contract	110	4	180	9	290	13
UC + vouchers + contract	200	7	99	4	299	11
UC + HEF (donor)	190	9	909	50	1099	59
UC + HEF (Gov)	270	12	458	23	728	35
UC + HEF (Gov) + vouchers	70	3	329	17	399	20
UC + HEF (Donor) + vouchers	20	1	30	2	50	3
Total	2523	114	4867	266	7390	380

Note: All policies introduced in communes between 2005 and 2009).

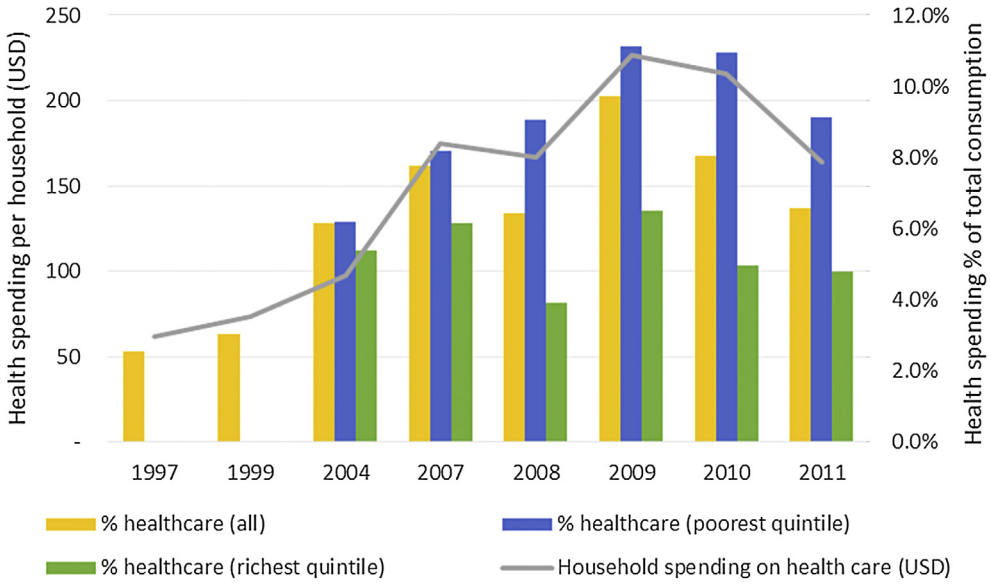

Fig. 1. Trends in health spending per household (US dollars) and % of consumption. Source: Cambodia Socio-Economic Survey 1997 to 2011.

absolute and relative terms has declined for most groups. The poorest in particular have seen a substantial reduction in the share of consumption devoted to health care.

The commune panel data from 1997 to 2011 reflects the strong upward time-trend in spending on health care and separately the positive effect of household economic status (Table 3). An lrtest was used to compare a model that incorporated random as well as fixed commune effects with fixed effects only. The mixed effects model was preferred (Chi2 = 20.1, $p < 0.001$). Most of the policy dummy variables for the year in which the policy is implemented in a commune are positive but not significant suggesting that there is no strong evidence of an immediate impact of any financing policy on household healthcare spending. This is perhaps unsurprising given that most policies take time to impact on behaviour and longer still to show up in spending patterns. By contrast, the variable for the number of years since the user fee policy was introduced is positive and statistically significant suggesting higher health care spending in the years following the introduction of user fees. The coefficients for donor HEF and vouchers are negative and statistically significant ($p < 0.05$) and for government HEFs, negative but not significant. Although it is unrealistic to suppose that a linear trend continues following implementation, estimation suggests that this is an adequate simplification over the period of estimation. Square and logarithmic post implementation trend terms were also added but did not add significantly to the explanatory power of the model (lrtest produced $p = 0.51$ and $p = 0.31$ respectively).

Marginal effects are obtained for years following implementation compared to areas where there is no policy (Table 4). These suggest that after three years, spending is 7% higher in areas implementing user fees. Conversely in areas with vouchers spending is 25% lower and 8% lower in areas with donor financed HEF. The results in voucher areas appear large given that voucher mechanisms focus only on maternal and some other reproductive health services.

The commune-panel data examines the effect of policy on the spending of the average household. Most of the policies, however, are designed to target the poor and other vulnerable groups. Although we control for commune level living standards and a general secular trend in spending, we also cannot discount the possibility that policy-specific time-trends are confounded by macro-economic and other secular trends in variables that occur at the same time as the roll out of specific financing policies.

Table 3
Impact of financing policy on health spending at commune level (multi-level, mixed effects).

	Coef.	SE	
Year	0.086	0.007	***
Commune types			
User fee	−0.085	0.075	
Voucher	0.219	0.070	***
HEF donor	−0.144	0.073	**
HEF government	0.101	0.107	
CBHI	−0.033	0.089	
Implementation dummies			
User fee	0.066	0.088	
Voucher	0.150	0.152	
HEF donor	0.176	0.119	
HEF government	0.327	0.255	
CBHI	−0.150	0.156	
Time since implementation			
User fee	0.021	0.010	**
Voucher	−0.148	0.054	***
HEF donor	−0.056	0.023	**
HEF government	−0.097	0.089	
CBHI	0.041	0.033	
Constant	−177.72	14.075	***
n	3135		
Groups	180		
Log likelihood	−4907		

Standard errors (SE) are corrected for clustering at commune and district level. Additional covariates included: consumption (log), average age, proportion of households with male heads, household size.
Statistically significant at: *** 1%, ** 5% and * 10% level.

Table 4
Percentage change in average per capita health spending (marginal effects).

Years following policy change	User fee	Voucher	Donor HEF
0	0%	11%	12%
1	2%	−4%	6%
2	4%	−17%	−0%
3	7%	−25%	−8%

The second part of the analysis examines policy impact at a household level between 2004 and 2009. The use of interaction terms in a difference-in-difference multivariate regression helps to disentangle the impact of policy from the effect of other covariates and the general increase in spending over time.

With the exception of areas with vouchers and donor financed equity funds, none of the policies have a significant impact on the utilisation of public facilities by poor households (Table 5). In contracting areas, there is a significant ($p = 0.02$) negative impact on utilisation of private facilities and a positive but non-significant ($p = 0.17$) impact on public facility use. There is a large significant ($p < 0.01$) impact on the use of public facilities offset by a substantial reduction in their use of private facilities in areas that have vouchers and health equity funds. The sample of households in these areas is, however, extremely small (50 across both years).

For the richest 40%, the impact on utilisation of services is rather more substantial. A significant ($p < 0.05$) increase in public sector utilisation is evident in areas with donor equity funds (with and without vouchers), Government HEF when combined with vouchers and contracting areas that have vouchers. In most cases there are increases also in private sector use of facilities in these areas. This is notable given that most financing policies are largely designed to encourage use of public facilities by the poor.

Formalising user fees in public facilities appears to increase total per capita health spending across all households, although the effect is not statistically significant ($p = 0.2$) (Table 6). The effect averages counteracting effects for poor and non-poor. Spending by the poor fell by 11,798 riels per capita, per month ($p = 0.02$) while it increased by 5,215 for the non-poor ($p = 0.047$). For the poor, both the number paying a positive amount and the average amount for payers fell. Conversely the number paying and amount paid increased for the non-poor.

For the poorest 40% of the sample, most of the policies aimed at mitigating the effects of charging appear to have an insignificant, positive effect on whether or not a payment is made and a negative effect on the average positive payment. The overall treatment effect is negative for all policies. The poor living in areas with health equity funds financed by donors report a larger reduction in spending, 16,545 riels per capita, per month ($p < 0.01$). The effect in government HEF areas is substantially smaller and not statistically significant.

Vouchers implemented on their own appear to have a small, not significant effect on spending; a finding that is unsurprising since they are focused only on reproductive health services. However in areas where vouchers are combined with health equity funds (government or donor) the negative effect on spending is more substantial.

Surveys do not separate funding by facility type which hinders attempts to disaggregate the impact by public and private facility. If it is assumed that the first (2009 survey questionnaire) or main provider (2004 survey) reflects the dominant use of health spending, the marginal effect on the poor in public facilities for all policies combined is larger (45,130 riels per month) although significant at only the 10% level ($p = 0.06$).

The application of user fees in contracting areas appears to be similar to that in non-contracting areas. However the impact on spending by the poor in contracting areas with vouchers is substantially larger than in areas that have vouchers but without contracting.

The impact of the policies on the household health spending of the relative rich (top two quintiles) is largely positive. In addition to higher spending for non-poor households in areas that have

Table 5
Total impact on utilisation (marginal effects).

Policy		Public[a]			Private[b]			All		
		Coef.	SE		Coef.	SE		Coef.	SE	
All households										
1	User fees (UF)	0.06	0.03	*	0.02	0.06		0.06	0.07	
2	UF + vouchers	0.06	0.03	**	0.10	0.09		0.16	0.10	
3	UF + contract	0.09	0.04	**	0.17	0.07	**	0.29	0.09	***
4	UF + vouchers + contract	0.06	0.03	*	0.33	0.19	*	0.32	0.16	**
5	UF + HEF (donor)	0.11	0.03	***	−0.04	0.07		0.03	0.09	
6	UF + HEF (Gov)	0.03	0.08		0.24	0.08	***	0.32	0.10	***
7	UF + HEF (Gov) + vouchers	−0.01	0.06		0.14	0.07	*	0.02	0.08	
8	UF + HEF (Donor) + vouchers	0.12	0.04	***	0.22	0.10	**	0.36	0.09	***
Poor (bottom two quintiles)										
1	User fees	−0.06	0.13		−0.10	0.20		−0.09	0.15	
2	UF + vouchers	−0.06	0.15		−0.28	0.26		0.07	0.18	
3	UF + contract	0.05	0.15		−0.51	0.21	**	0.11	0.21	
4	UF + vouchers + contract	−0.37	0.22	*	0.19	0.27		0.28	0.22	
5	UF + HEF (donor)	0.13	0.18		−0.12	0.22		−0.03	0.17	
6	UF + HEF (Gov)	−0.13	0.15		0.15	0.21		0.20	0.17	
7	UF + HEF (Gov) + vouchers	Insufficient utilisation in areas to permit estimation								
8	UF + HEF (Donor) + vouchers	0.95	0.12	***	−3.06	0.35	***	0.39	0.27	
Non-poor (Top two quintiles)										
1	User fees	0.04	0.02	*	0.14	0.07	*	0.19	0.08	**
2	UF + vouchers	0.06	0.03	*	0.10	0.09		0.17	0.10	*
3	UF + contract	0.02	0.07		0.29	0.14	**	0.36	0.15	**
4	UF + vouchers + contract	0.06	0.03	*	0.20	0.18		0.25	0.18	
5	UF + HEF (donor)	0.11	0.04	**	−0.08	0.09		−0.01	0.10	
6	UF + HEF (Gov)	0.04	0.03		0.32	0.10	***	0.36	0.10	***
7	UF + HEF (Gov) + vouchers	0.66	0.08	***	0.25	0.06	***	0.26	0.06	***
8	UF + HEF (Donor) + vouchers	0.64	0.06	***	0.38	0.13	***	0.56	0.13	***

Statistically significant at: *** 1%, ** 5% and * 10% level.
Household covariates included: age/sex composition of household, education, occupation, ethnic group, age, sex and marital status of head of household,, household landholding, asset index, year of survey. Community covariates included: presence/absence drug-store, distance to health centre/district hospital, presence of public programme for immunisation/HIV/family planning, endemic dengue, regional dummy.
[a] Public hospital or health centre.
[b] Non-government hospitals, private clinics and pharmacies/drug-stores.

Table 6
Total per capita spending on health by household (per day in riels) two part regressions and total impact (marginal effect).

Policy		Probit		GLM		Combined		
		Coef.	SE	Coef.	SE	Change in spending	SE	Relative effect
All households								
1	User charges	0.12	0.21	0.33	0.29	5215	134	43%
2	UC + vouchers	0.43	0.25	−0.16	0.35	2675	161	20%
3	UC + contract	0.83	0.22	0.09	0.33	9779	152	73%
4	UC + vouchers + contract	0.83	0.52	−0.81	0.36	−943	227	−7%
5	UC + HEF (donor)	0.33	0.27	−0.62	0.39	−3911	181	−28%
6	UC + HEF (Gov)	0.57	0.26	0.09	0.38	6982	175	53%
7	UC + HEF (Gov) + vouchers	−0.33	0.31	1.22	0.39	11,085	188	82%
8	UC + HEF (Donor) + vouchers	0.87	0.42	0.55	0.33	15,640	197	119%
Poor (bottom two quintiles)								
1	User charges	−0.33	0.43	−0.98	0.40	−11,798	167	−70%
2	UC + vouchers	0.38	0.47	−0.80	0.52	−4549	200	−41%
3	UC + contract	0.27	0.46	−1.27	0.43	−9833	178	−66%
4	UC + vouchers + contract	0.79	0.66	−2.27	0.51	−14,989	234	−84%
5	UC + HEF (donor)	−0.10	0.51	−1.68	0.44	−16,545	190	−83%
6	UC + HEF (Gov)	0.11	0.48	−0.96	0.46	−8126	186	−58%
7	UC + HEF (Gov) + vouchers	−1.67	0.52	−1.07	0.47	−23,194	201	−96%
8	UC + HEF (Donor) + vouchers	0.24	0.66	−1.94	0.61	−16,271	256	−83%
Non-poor (Top two quintiles)								
1	User charges	0.40	0.23	0.44	0.36	10,617	176	112%
2	UC + vouchers	0.32	0.28	−0.36	0.48	−854	235	−9%
3	UC + contract	1.15	0.44	−0.08	0.83	12,325	413	78%
4	UC + vouchers + contract	0.38	0.55	−0.87	0.64	−7721	311	−44%
5	UC + HEF (donor)	0.33	0.27	−0.93	0.62	−8148	291	−48%
6	UC + HEF (Gov)	0.95	0.26	−0.25	0.47	8316	223	42%
7	UC + HEF (Gov) + vouchers	0.02	0.17	1.42	0.53	19,028	236	320%
8	UC + HEF (Donor) + vouchers	1.15	0.52	0.88	0.48	24,978	300	371%

Statistically significant at: *** 1%, ** 5% and * 10% level.
Covariates included: as for Table 5.

implemented user fees, higher payments are also reported in areas that have in addition health equity funds (government), contracting and health equity funds combined with voucher schemes. A reduction in spending is reported in areas that have donor health equity funds and vouchers with contracting but these are not statistically significant ($p > 0.35$).

4. Discussion

4.1. Limitations

The introduction of a variety of policies with similar objectives often in the same areas means that it is challenging to disentangle their effects. Although the study allows interactions between policies this cannot account for all local variations where implementation is left to health facilities and implementing non-government organisations. Any assessment of general policies using national data inevitably averages and simplifies the specific impacts of local policy. Furthermore, the intervention landscape in Cambodia is crowded and it is difficult to describe and account for the effect of all policies on spending and utilisation. We cannot rule out that other policies not included in the analysis are influencing the results reported here. The data analysed here is historic, spanning the introduction of user fees and gradual development of financing schemes. It does not cover the most recent period when equity funds have expanded substantially to cover much of the country.

The analysis is limited by the relatively crude nature of the health service utilisation data which indicate whether or not services were provided but not what was received during a visit and whether the services were necessary. The impact evaluation does not, therefore, provide an understanding of whether policies encouraged more effective use of services. The way households were asked to report providers used also varied across surveys making it difficult to separate out accurately the spending that is attributable to public and private facilities. Furthermore, it was not possible to separate unofficial from official payments. We observe that formalisation appears to have little effect on total payments and assume that this was because unofficial payments arrangements were formalised. We cannot, however, be certain that substantive unofficial payments did not continue to displace official fees. Evidence from elsewhere, however, suggests that formalisation was successful in that income from this source rose substantially over the period. By 2012, user fee income in public facilities amounted to $27 million across the country (Government of Cambodia, 2013).

The difference-in-difference method assumes parallel trends implying that without policy the change in health spending and utilisation would have been at similar levels in intervention and control areas. We apply a parallel trends (Pischke, 2016) test by regressing average health spending interactions between the policy variable and time-dummy variables, a time variable and policy dummy; significance of the interaction term after policy introduction but not before is taken as evidence supporting the parallel trends assumption. Between 1999 and 2004, the proportion of communes with any policy increased from 12 to 55%. We take 2004 as the breakpoint year of particular significance. We find that coefficients on the interaction term prior to 2004 were not significant (1997 $p = 0.35$, 2000 $p = 0.13$) while after 2004 coefficients they are all significant ($p < 0.02$ for all years). We also looked at the characteristics of the areas with and without financing policies (based on a Mann-Whitney non-parametric test for survey mid-year, 2004) and found no statistically significant differences in characteristics including household consumptions ($p = 0.18$), proportion living in urban areas ($p = 0.15$) or reported illness episodes (0.79).

4.2. Formalising user fees

User fees were designed to formalise payment arrangements and provide facilities with additional income. Fixing fees with clear

exemptions was designed to make fees more transparent and predictable. Retention of a large proportion of the revenue by facilities should help to improve services but may also encourage facilities to collect from those that are unable to pay. It has been observed that these features introduced a dimension of output-based funding that have allowed services to develop (Bigdeli and Ir, 2010).

The policy of formalising user fees had no significant detectable impact on the utilisation of public (or private) facilities in the full sample. This finding differs from previous studies (Barber et al., 2004; Akashi et al., 2004) which report an increase in the utilisation of inpatient and outpatient health services following the formalisation of user fees. This may be due to methodological differences such as estimation strategies and sample-types. Previous studies have used samples drawn from a smaller population and a simple before-after estimation strategy while we use a nationally representative sample and estimation strategies that control for confounding factors.

Utilisation and the proportion of the poor paying some charge showed no significant change but those utilising services paid substantially less than before. The poor are thus no more dissuaded to access services under formal compared to informal fees. Once at a facility, the negative impact on payments for the poor suggests that they paid less in areas where fees are formalised as informal fees were replaced with formal tariffs that often offer local waivers for those on low incomes. The non-poor paid more than before the change and were slightly more likely to utilise public and private services. A lagged effect of user fees over a longer time period is suggested by the panel data. Fees paid by the non-poor appear to more than substitute for any reduction in unofficial fees so that on average they pay more than before but their utilisation is unaffected. Previous studies have suggested that revenues generated through the formalisation of user fees have been used within facilities to provide exemptions to poorer users (Akashi et al., 2004). This may explain the differential impact of the policy on OOP payments incurred by the poor and non-poor.

4.3. Reducing financial barriers

Efforts to reduce the burden of health care costs on the population show mixed effects. Most of the policies reduced payments by poor households. The reductions are particularly large for areas that combine policies with the largest effects in areas that combined health equity funds and voucher mechanisms. The panel analysis further suggest the effects appear to build up over time possibly as mechanisms are strengthened and entitlement is more widely known to the population.

It is interesting to compare the effects of mitigation policies with areas that introduced only user fees. Some of the policies appear to have a weaker effect on per capita payments than do the effect of user fees alone. Heterogeneity in the application of user fees may partly explain this effect if areas that have user fee policies that have had a particularly negative impact on service uptake are the areas that are more likely to implement mitigation policies.

There are no previous studies looking at the quantitative impact of user fee formalisation. Where comparisons of policy can be made with previous studies, changes recorded are comparable. Flores et found that the reduction for households in donor funded HEF areas was 9,000 (per day) compared to the 16,000 we find here but confidence intervals overlap (Flores et al., 2013). The same study found a (not significant) reduction of 8,700 for government HEFs compared to 8,100 found here. Similarly, the finding on the impact of HEFs on health service utilisation by the poor resonates with previous studies. The only significant impact on utilisation was found for areas that have both vouchers and health equity funds which demonstrated a significant reduction in private sector use, increase in use of the public sector and substantial reduction in health care spending (albeit a finding derived from a relatively small sample). The strong impact of vouchers in the panel analysis is somewhat puzzling given that vouchers only apply to a small number of reproductive health services. A previous study suggested a strong positive effect on maternal care utilisation (antenatal and delivery care) that is larger for the poor (Poel et al., 2014) but this utilised reproductive health survey data whereas our results are based on a more general survey. Our household analysis makes clear, however, that the impact is only large and significant where they are introduced together with health equity funds or contracting. This suggests that the recorded effects of vouchers in the panel analysis may be picking up the effects of other policies as a result of their correlation in roll-out. This is corrected in the more detailed consideration of interactions undertaken in the household analysis which isolates the individual and joint effect of policies.

Several policy combinations appear to encourage use of public services by the non-poor which is possibly partly due to the universality of some policies in some areas, notably maternal vouchers. It may also be that the additional funding provided through these mechanisms allows a general improvement in services that benefit those most able to access them. There are also likely to be differences in the way households are defined as poor between collecting survey data on the poor and time of service use.

With a few exceptions the impact of different policy combinations on household payments are not substantially different. Some effects spill-over to the non-poor and even to the use of facilities outside the public sector. One interpretation of this is that although individual policies have different objectives most require general health system strengthening - improving human resources, enhanced financial management, quality of care improvements, better information systems – that have an impact well beyond the individual scheme. It suggests the need to consolidate existing schemes, focusing on the aspects of mechanisms such as equity funds that are most cost-effective. This would provide a foundation for more radical extension of coverage for health care costs that could lead to the development of universal health coverage. It also begs the question of whether the mitigation of costs could be achieved more cost-effectively and without the huge investment in often overlapping, parallel systems. Further work is recommended to look at the relative cost-effectiveness of these often overlapping mechanisms in the context of the development of a coordinated approach to policy.

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