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Healthcare Access Among Cambodia's Poor: An Econometric Examination of Rural Care-seeking and Out-of-Pocket Expenditure

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Abstract: To inform efforts to improve Cambodia's social health protection system and advance universal health coverage, health care-seeking and out-of-pocket expenditure (OOPE) were assessed using the 2016 Cambodia Socioeconomic Survey data. This study focuses on the poorest wealth quintile who reside in rural areas- the primary target population of Cambodia's largest social health protection scheme, the Health Equity Fund (HEF). The study also estimates the proportion of poor with an Equity card which provides access to HEF benefits at public facilities. Overall, 76% of people who sought healthcare in the past 30 days went to private providers, paying, on average, US$39.43 for treatment. About 18% of patients first sought care from public facilities, paying, on average, US$38.15. Though HEF aims to provide free healthcare for the rural poor, this analysis found that 67.2% of such patients seeking first care at public health facilities pay, on average, US$11.61 after controlling for confounding factors. However, treatment expenditure among the rural poor is about 52% less compared to third wealth quintile patients (p<0.01). About 36% of people under the national poverty line do not hold an Equity card to access HEF benefits. Thus, we conclude that HEF is not yet fully reaching its intended impact of removing OOPE as a barrier to access among the poor. Finally, free access to healthcare should incentivize utilization of public services; however, this study was unable to isolate such an effect among patients from the poorest wealth quintile. Access to healthcare can be strengthened with policy directives focused on further reducing OOPE and addressing other challenges to improve patient demand for public services such as quality of care. Enrollment exclusion errors should be corrected by relaxing the eligibility criteria with population coverage expansion. In addition, health service access should be systematically monitored by integrating service utilization, OOPE, and quality indicators into national monitoring and evaluation systems.

Keywords: Universal Health Coverage, Social Health Protection, Out-of-Pocket Expenditure, Social Protection Policy, Cambodia, Vulnerability, Rural Poor

1. Introduction

1.1. Background

The Royal Government of Cambodia has established the reduction of poverty, vulnerability, and inequality as explicit policy goals in its National Social Protection Policy Framework (NSPPF) 2016–2025. The Framework aims to improve and expand existing social health protection schemes to achieve universal health coverage (UHC). UHC

requires financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all [1]. A study comparing the UHC service coverage index[1] among 52 countries found Cambodia to have one of the highest disparities between the national average and the poorest wealth quintile [2].

To inform and advance Cambodia's national policy objectives to achieve UHC we examine rural healthcare access focusing on the poorest wealth quintile. Access to healthcare refers to the ease with which people can obtain needed health services, or the ability to use health services with financial risk protection [3-4]. Access has three dimensions: physical accessibility, financial affordability, and acceptability [4-6]. Quality, which includes structure, process, and outcomes is a core element for each dimension of healthcare access [7-8]. Care-seeking and Out-of-Pocket expenditure (OOPE) were assessed to understand provider choice as well as estimate the effect of the Health Equity Fund (HEF) on access to public services by improving financial affordability among the poor.

1.2. Care-seeking and Out-of-Pocket Expenditure

The assessment of health care-seeking can help to explain access inequities and evaluate demand and supply-side interventions [9-11]. Likewise, OOPE, a key aspect of financial affordability, can be a barrier to health service access and cause financial hardship [12]. Even relatively modest OOPE can cause indebtedness and impoverishment [13]. Recent data indicates that OOPE constitute approximately 60% of total health expenditure, implying a high risk for healthcare-related financial hardship [14]. Although OOPE is decreasing, international evidence suggests that to progress towards UHC requires the proportion to be about 30% [15-16].

1.3. Health Equity Fund

The HEF, Cambodia's largest social health protection scheme, established to improve access to healthcare for the poor, currently provides insurance to about 2.6 million poor people [17-18]. The scheme reimburses public health facilities for user fees[2] normally paid by the patient with the aim of eliminating OOPE [19]. The HEF benefit package includes consultations, diagnostic tests, and medicines on the essential drug list. Beneficiaries are primarily identified using a nationwide ID Poor system. This system combines proxy means testing, using observable household characteristics and assets, and community-based targeting and issues an Equity card to households determined to be poor. The ID

Poor system initially focused on rural areas and was only expanded to include urban areas beginning in 2016 [20].

An additional 5% of HEF beneficiaries are identified using a complementary post-identification process managed by public hospitals using a standard tool [20]. By 2015, HEF was expanded to reimburse services at all public health facilities in the country [17].

There is evidence of exclusion and inclusion errors related to the ID Poor system. The HEF presently covers about 16% of the country's population[3]. This is less than the proportion in the first quintile (20%), but higher than the (2019) official national poverty rate of 12.5%. A recently completed analysis found that less than 50% of Equity card holders are under the nation poverty line [21]. As half of Equity cardholders represent about 8% of the population, the exclusion gap equates to 4.5 percentage points - the difference between the official poverty rate and those officially classified as poor who hold a card. This means that about 36% of people under the national poverty line do not hold an Equity card. This is consistent with other evidence showing 30% of the poor are excluded from HEF [22].

According to the 2014 Cambodia Demographic and Health Survey (CDHS), an overwhelming majority of adults (aged 15-49 years), ―84% of women and 87% of men, ―do not have health insurance. HEF coverage was the most frequently reported health insurance: 11.8% of women and 8.5% of men. The largest proportion of those reporting HEF coverage was among the first and second quintiles: 67.8% among women and 66.8% among men [23].

1.4. Health Provider Selection and Cost of Care

The 2014 CDHS found that more than two-thirds (67.1%) of household (HH) members who were ill or injured in the past 30 days sought their first treatment in the private sector; 21.9% sought first treatment in the public sector, 4.5% in the non-medical sector (see Table 1), and 1.6% outside the country. The mean cost of care (excluding transport) for first treatment was estimated at US$48.76 for public care, US$33.00 for private care, US$8.54 for non-medical care, and US$202.49 for treatment outside the country. The higher cost of public care, compared to private care, may be related to the illness severity or facility type.

2. Methods

2.1. Data

This study analyzed the nationally representative 2016 CSES data. The dataset contains information on demographic characteristics, housing, education, labor force, household income, consumption and healthcare for 2,289 rural households with 10,013 individuals, including 1,772 people who had sought healthcare in the past 30 days.

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1 The index is based on 16 indicators, which included four from each of the categories of reproductive, maternal, newborn, and child health; infectious disease; non-communicable diseases; and service capacity and access.

2 User fees are the fixed amounts that public health facilities charge patients for a service. These are the amounts that are reimbursed for Health Equity Card holders.

3 Based on 2019 mid-year population projection of 16.3 million from the National Institute of Statistics.

Following the survey's categorization, 20 healthcare provider-type categories were consolidated into four principle provider types: private sector, public sector, non-medical, and overseas (see Table 1).

Table 1. Provider Types and Sub-categories.

Provider Type	Sub-categories
Private Medical Sector	Private hospital
	Private clinic
	Private pharmacy
	Home/office
	Home visit
	Other private medical
Public Sector	Hospitals
	National hospital
	Provincial hospital
	District hospital
	Health center
	Health post
	Rehabilitation center
Non-medical	Drug shop/market
	Kru Khmer/traditional healer
	Monk
	Traditional Birth Attendant
	Other

Note: Overseas medical service has no sub-categories.

As there is no direct, reliable measure of HEF enrollment in the 2016 CSES; and, the primary HEF eligibility criterion is poverty, this analysis used first wealth quintile as a proxy for HEF eligibility. In addition, as ID Poor was only initiated in urban areas in 2016-2017, the analysis was restricted to rural areas.

2.2. Statistical Methods

First, this study assessed health service care-seeking by provider type and wealth quintile. Second, a multinomial logistic regression model was fit to estimate the incremental effect of wealth on the selection of provider-type. This approach models the log odds of multiple outcomes as a linear combination of the predictor variables. The Provider-type regression model controls for: (1) distance to provider, proxied by transport costs; (2) consultation type (i.e. preventative or curative); (3) facility type (i.e. hospital or not); (4) OOPE; (5) patient age; and (6) patient age squared. The analysis tested other factors that could explain provider selection including care-seeking frequency, chronic illness, household size, as well as head-of-household employment category, education level, and sex; and, interaction terms were tested between all pairs of independent variables. These variables were excluded from the final model as they did not improve the fit as evaluated using the log ratio test, and Akaike and Bayesian information criteria [24].

Equation 1 expresses the final provider choice regression model.

$$First\_Care\_Provider\_type_i = B_0 + B_1 Effective\_income_i + B_2 Transport\_Costs_i + B_3 Consultation\_type_i + B_4 Facility\_type_i + B_5 OOPE_i + B_6 Age_i + B_7 Age^2_i + \varepsilon \quad (1)$$

Third, to estimate OOPE at public health facilities, a generalized linear regression model (GLM) was fit (see Equation 2). GLM is appropriate for skewed (i.e., expenditure) data and avoids retransformation issues using a logged dependent variable [24]. The OOPE regression model controls for: (1) distance to provider, proxied by transport costs; (2) facility type (i.e. hospital careseeking or not); (3) chronic condition (i.e. having the reported illness for over one year); (4) frequency of care seeking (i.e., the number of times the patient sought care in the past 30 days); (5) patient age; and (6) head of household age. Finally, the analysis tested other factors that could explain the variation in OOPE, including healthcare service type (curative or preventive), patient age squared, household size, as well as head-of-household employment category, education level, and sex; and, interaction terms were tested between all pairs of independent variables. These variables were excluded from the final model as they did not improve the fit [24].

Equation 2 expresses the final OOPE regression model.

$$OOPE_i = B_0 + B_1 Wealth\_quintile_i + B_2 Transport\_costs_i + B_3 Facility\_type_i + B_4 Chronic\_condition_i + B_5 Careseeking\_frequency_i + B_6 Patient\_age_i + B_7 HH\_head\_age_i + \varepsilon \quad (2)$$

This model was used to estimate the expected effect of wealth quintile on OOPE by adjusting OOPE to zero for all patients in the first quintile and reruning the fitted model. The diffence between the actual (i.e., coefficients estimated using unadjusted data) and expected effect (i.e., coefficients estimated using adjusted data) was then tested for significance [25].

In most household surveys, income is commonly under-reported, vulnerable to random shocks, and possibly negative because investment is not depreciated [23]. For these reasons, expenditure data are generally considered more reliable than income data [26-28]. This analysis used consumption expenditure as effective income [14]. Income and consumption expenditure data were winsorized to transform values above the 99th percentile to the 99th percentile, limiting the influence of outliers [30]. Analyses were adjusted for sample design; Stata 15.1 was used for all data management and analysis [31].

3. Results

The survey data estimates that over three-quarters (76.5%) of Cambodia's population resides in the rural areas; 23.5% live in urban areas (not shown). Figure 1 presents the proportional breakdown of the rural population by wealth quintile. In Cambodia's rural areas, over half of the population (52.9%) are in the two lowest quintiles: 28.5% in the poorest quintile, and 24.4% in the second quintile.
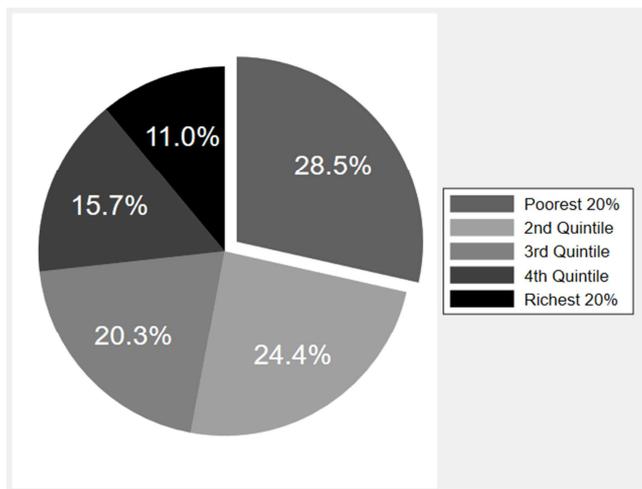
***Figure 1.** Rural Population Distribution by Wealth Quintile.*

3.1. Health Service Care-seeking

Table 2 presents care-seeking summary statistics for key variables among rural residents as reported during the past 30 days. Overall, 16.8% of the rural population reported suffering from an illness or injury with 94.3% seeking care for that condition. Among those seeking care, the mean transport cost was US$2.39 and illness duration 11.3 days. Under 5% of those seeking care did so at a hospital (public or private). Over 22% identified the presenting illness as a chronic condition; and, 80.1% reported seeking curative care as opposed to preventive. Among patients seeking any care in the past 30 days, they reported doing so, on average, 1.78 times in that period. A secondary analysis of each variable by wealth quintile (not shown) only found transportation expenditure and illness duration to have statistically significant differences in the mean estimate among wealth quintiles. These differences were limited to a comparison between the poorest quintile and the richest.

Overall, 75.7% of rural patients used the private sector as their first point of contact for either curative or preventive health services. Only 17.8% first sought healthcare among public services compared to 5.4% from non-medical providers; and 1.1% outside of Cambodia (not shown). However, among the 80.1% of people seeking curative services, 81.3% went first to the private sector, 12.9% to the public sector, and 5.1% to non-medical providers (not shown). By contrast, among the 19.9% of people seeking preventive services, 55.9% went first to a private provider, 39% to a public provider, and 2.3% to a non-medical provider (not shown).

***Table 2.** Descriptive Characteristics of Key Careseeking Variables among Rural Residents.*

Variable	Type	Units	Point Estimate	95% CI
Illness or Injury	binary	Proportion sick or injured	16.8%	81.7-84.7%
Seeking care	binary	Proportion of sick/injured seeking care	94.3%	91.1-96.3%
Patient age	discrete	Mean years	33.0	31.4-34.6 years
Head of Household age	discrete	Mean years	48.3	47.2-49.4 years
Careseeking frequency	discrete	Mean times	1.78	1.7-1.9 times
Chronic condition	binary	Proportion chronic	22.3%	19.9-24.9%
Consultation type	binary	Proportion curative	80.1%	75.4-84.1%
Distance to facility/ Transport costs	continuous	Mean USD	$2.39	$1.96-2.82
Facility type	binary	Proportion seeking care at hospital	4.6%	3.8 -5.6%

Among patients reporting more than one visit to a healthcare provider in the past 30 days, private sector utilization increased to 84.4% for the second visit, compared to 10.4% for the public sector, 4.2% for non-medical, and 1% for overseas (not shown).

Table 3 presents the marginal effects of the independent variables on health provider utilization for the first-time care visit, using adjusted predictions and controlling for all other covariates. Marginal effects show the change in probability when the predictor variable increases by one unit. After controlling for all other covariates, the adjusted probability of private sector care seeking was found to be 10.5% less among patients seeking preventive care relative to those seeking curative care (p< 0.000). In addition, the probability of private sector care seeking increased by 0.1% for every dollar increase in OOPE (p<0.035), holding all other variables constant. For public care seeking, there was an estimated 0.3% increased probability in utilization for every dollar spent on transport (p<0.029); a 11.8% increase associated with preventive care seeking (p<0.000); a 33.8% increase among patients seeking care at a hospital (p<0.000); a 0.5% decrease in probability with every US$10 increase in OOPE (p<0.02); and a 0.3% decrease in public provider care seeking for every one year increase in patient age (p<0.001), although that trend tapered off and reversed as patient age increased (p<0.004). The model did not identify any statistically significant factors associated with non-medical service seeking, although a statistically significant association with effective income was found (see below). As expected, care seeking overseas was associated with increased distance to provider/transportation costs (0.01% for every additional dollar in transport expenditure) and was 16% less probable among patients seeking hospital care compared to non-hospital care.

***Table 3.** Marginal Effects of Key Variables on Health Provider Utilization for First-time Care Visit among Rural Residents.*

Variables	dy/dx	Std. Err.	t	P>t	[95% Conf.	Interval]
Private Sector						
Wealth Quintile						
Poor	-0.018	0.033	-0.55	0.586	-0.083	0.047
Near-poor	-0.030	0.031	-0.98	0.325	-0.091	0.030
Middle-income (base)	-	-	-	-	-	-
Upper-middle	-0.014	0.044	-0.32	0.751	-0.100	0.072
Rich	0.041	0.044	0.94	0.346	-0.045	0.127
Distance to provider	0.000	0.006	0.01	0.995	-0.012	0.012
Consultation type	-0.105	0.027	-3.85	0.000***	-0.158	-0.051
Facility type	-0.123	0.071	-1.72	0.086	-0.262	0.017
OOPE	0.001	0.001	2.12	0.035*	0.000	0.002
Patient age	0.002	0.001	1.75	0.082	0.000	0.005
Patient age (squared)	0.000	0.000	-1.53	0.128	0.000	0.000
Public Sector						
Wealth Quintile						
Poor	-0.004	0.026	-0.14	0.889	-0.055	0.048
Near-poor	0.024	0.026	0.94	0.349	-0.027	0.075
Middle-income (base)	-	-	-	-	-	-
Upper-middle	0.002	0.032	0.08	0.940	-0.061	0.066
Rich	-0.003	0.041	-0.08	0.940	-0.083	0.077
Distance to provider	0.003	0.002	2.20	0.029*	0.000	0.006
Consultation type	0.118	0.020	5.80	0.000***	0.078	0.159
Facility type	0.338	0.023	14.67	0.000***	0.293	0.383
OOPE	-0.0005	0.000	-2.33	0.020*	-0.001	0.000
Patient age	-0.003	0.001	-2.96	0.003**	-0.005	-0.001
Patient age (squared)	0.0000	0.000	2.60	0.010**	0.000	0.000
Non-medical						
Wealth Quintile						
Poor	0.021	0.020	1.08	0.280	-0.017	0.060
Near poor	0.014	0.018	0.79	0.432	-0.021	0.049
Middle-income (base)	-	-	-	-	-	-
Upper-middle	0.016	0.029	0.53	0.595	-0.042	0.073
Rich	-0.026	0.016	-1.65	0.099	-0.057	0.005
Distance to provider	-0.004	0.007	-0.66	0.511	-0.017	0.009
Consultation type	-0.017	0.018	-0.94	0.347	-0.052	0.018
Facility-type	-0.056	0.042	-1.32	0.187	-0.139	0.027
OOPE	-0.001	0.001	-1.34	0.182	-0.002	0.000
Patient age	0.001	0.001	1.21	0.229	0.000	0.002
Patient age (squared)	0.000	0.000	-0.90	0.367	0.000	0.000
Overseas						
Wealth Quintile						
Poor	0.000	0.007	0.06	0.953	-0.014	0.014
Near poor	-0.008	0.007	-1.14	0.254	-0.021	0.006
Middle-income (base)	-	-	-	-	-	-
Upper-middle	-0.004	0.011	-0.39	0.693	-0.025	0.017
Rich	-0.012	0.010	-1.19	0.234	-0.032	0.008
Distance to provider	0.001	0.000	2.36	0.019*	0.000	0.002
Consultation type	0.003	0.004	0.76	0.447	-0.005	0.011
Facility-type	-0.160	0.060	-2.65	0.008***	-0.278	-0.041
OOPE	0.000	0.000	1.84	0.067	0.000	0.000
Patient age	0.000	0.000	0.68	0.495	0.000	0.001
Patient age (squared)	0.000	0.000	-0.90	0.371	0.000	0.000

***P<0.001, **P<0.01, *P<0.05.

To more closely examine the associated marginal effects of income on provider choice, estimates were re-run replacing wealth quintile (categorical variable) with HH effective income (continuous). Figure 2 presents the predicted probabilities of healthcare seeking by provider type with 95% CIs after holding all other variables in the model constant. This approach revealed a small and statistically significant effect of income on healthcare provider choice for private and non-medical providers. The results show a statistically significant increase of 0.9% (p<0.046) in the probability of private provider utilization for every US$100 increase in monthly effective income. Analysis also shows a statistically significant decrease in the probability of non-medical utilization, by 0.7% for every US$100 in monthly effective income (p<0.05). However, this decrease tapered off when income approached approximately $1,050. No statistically significant change was detected in the adjusted probability of international care seeking with wealth quintile—likely a result of the relatively low representation in

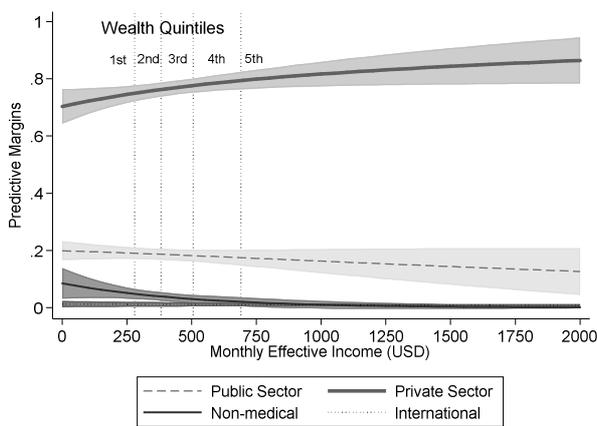the sample. The downward trend for public sector use as income increases is not statistically significant.

Figure 2. *Predicted Probabilities of Healthcare Seeking by Provider Type.*

Note: Figure 2 is truncated at $2,000; however, the winsorized upper limit (i.e., 99th%ile) of monthly effective income is $3,800.

3.2. Out-of-Pocket Expenditure (OOPE)

OOPE refers to the amount of money paid in the past 30 days for treatment which includes service costs, diagnostics, and medications; it does not include transportations costs. The weighted mean OOPE varies by provider type: US$38.15 [95% CI: $25.20–$51.10] for the public sector; US$39.43 [CI: $18.78–$60.10] for the private sector; US$5.82 [CI: $2.80–$8.84] for non-medical; and US$232.59 [CI: $88.93–$376.24] for international care.

Among all patients seeking healthcare, only 15.4% reported not paying for the service; 77.8% of those not paying for service sought care in the public sector. In addition, 67.2% of people from the first quintile households who sought healthcare at a public facility reported paying, on average (weighted, unadjusted- i.e. no controlling covariates) $10.84 [95% CI: $4.71–$16.98]. By comparison, the average treatment expenditure among first quintile patients at private medical facilities was $9.50 [95% CI: $8.01-$11.00]. Among first quintile patients who sought services at a public facility, 30.9% reported the primary source of financing of their treatment to be their savings; 4.1% borrowed money, and 2% sold assets or household production in advance.

Over 86.1% of the second quintile patients paid for service when seeking care at a public facility, compared to 91.0 and

93.2% of patients in the third and fourth quintiles, respectively. All patients from the richest quintile reported paying for services.

Figure 3 shows the weighted, adjusted (i.e. controlling for all other covariates in the model) mean OOPE among patients seeking care at public health facilities by wealth quintile. After controlling for all other covariates, the poorest quintile was estimated to pay US$11.61 [95% CI: $5.99–$17.22], the second quintile US$18.01 [CI: $11.16–$24.85], third quintile US$24.16 [CI: $13.38–$34.94], fourth quintile US$40.09 [CI: $25.51–$54.67], and richest quintile US$55.27 [CI: $31.96–$78.58].
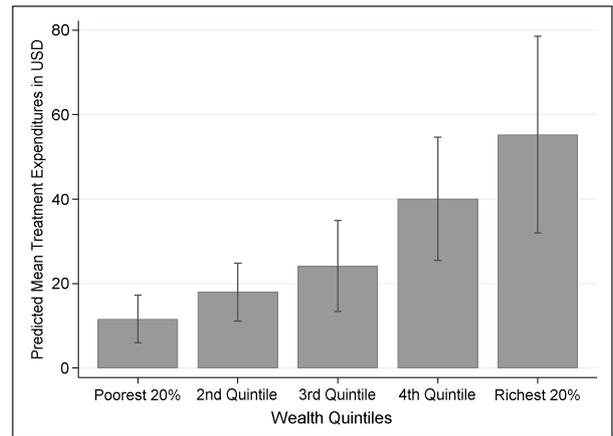

Figure 3. *Adjusted Average OOPE at Public Health Facilities for Rural Residents by Wealth Quintile with 95% Confidence Intervals.*

Table 4 presents the regression coefficients from the actual and expected OOPE at public health facilities among HEF-eligible patients. Compared with third quintile patients, OOPE among the poorest quintile at public health facilities show a statistically significant (p<0.01) decrease, by about 52% [-.519 = (exp (-0.733) -1] holding all other covariates constant. OOPE were adjusted to zero for all patients in the first quintile to estimate the expected effect of HEF on OOP; this approach confirmed a 100% [-1.0 = exp (-7.601) -1] reduction in OOPE among the poorest quintile. The difference between the actual and expected reduction in OOPE is statistically significant (z<0.000). Note that this adjustment in the data did not statistically change the coefficients for any other variable in the model.

Table 4. *Actual and Expected OOPE for Rural Residents at Public Health Facilities among First Quintile Patients.*

| Dependent Variables | Coefficients Explaining the Variation in OOPE | | | | | | Differences (actual less expected) | | |
| | Actual OOPE | | | Expected OOPE | | | | | |
	Coef. (B1)	Std. Err.	P>t	Coef. (B2)	Std. Err.	P>t	B1-B2	Z	|Z|>1
Wealth quintile									
Poorest	-0.733	0.28	0.010**	-7.601	0.20	0.000***	6.868	19.65	<0.000***
Second	-0.294	0.23	0.206	-0.219	0.22	0.318	-0.075	-0.23	0.818
Third (base)	-	-	-	-	-	-	-	-	-
Fourth	0.506	0.24	0.038*	0.531	0.23	0.019*	-0.025	-0.08	0.936
Richest	0.827	0.25	0.001***	0.926	0.24	0.000***	-0.099	-0.28	0.780
Distance to provider	0.050	0.01	0.001***	0.037	0.010	0.000***	0.012	0.70	0.484

| Dependent Variables | Coefficients Explaining the Variation in OOPE | | | | | | Differences (actual less expected) | | |
| | Actual OOPE | | | Expected OOPE | | | | | |
	Coef. (B1)	Std. Err.	P>t	Coef. (B2)	Std. Err.	P>t	B1-B2	Z	|Z|>1
Service frequency	0.257	0.14	0.070	0.181	0.108	0.094	0.076	0.43	0.667
Facility type	0.412	0.19	0.031	0.532	0.149	0.000	-0.120	-0.50	0.617
Chronic condition	0.110	0.21	0.609	0.322	0.128	0.012	-0.212	-0.85	0.395
Patient age	0.018	0.00	0.000***	0.015	0.003	0.000***	0.003	0.54	0.589
Head of HH age	-0.015	0.01	0.018*	-0.014	0.005	0.006**	-0.002	-0.23	0.818
Constant	2.262	0.59	0.000	2.015	0.365	0.000	0.247	0.36	0.719

***$P<0.001$, **$P<0.01$, *$P<0.05$.

Actual OOPE showed a statistically significant increase with distance to healthcare provider—by about 5% [0.051 = exp (0.050)-1] for each additional US$1 spent on transport; and patient age—by about 2% [0.018 = exp (0.018)-1] for every additional year of age. In addition, analysis showed a statistically significant effect of age of the head of household decreasing costs by about 2% [-0.015 = exp (-0.018)-1] for every additional year.

4. Discussion

4.1. Limitations

There are several limitations of this study. Foremost, the first quintile is an imperfect proxy for HEF eligibility. Because HEF eligibility is determined using a proxy means test with community validation, there is no income threshold that can be applied for analysis. This issue is further complicated by evidence of enrollment exclusion and inclusion errors as discussed above. In addition, the population proportion identified by ID Poor does not align with the official national poverty rate that is based on consumption with a monetary threshold. Nevertheless, there are several strong arguments to support the use of the first quintile as a proxy for HEF eligibility. First, a recently completed analysis found that about 90% of households targeted by ID Poor are classified as poor under a vulnerability line of 1.5 times the national poverty threshold [21]. The real 2016 value of this monthly per capita vulnerability threshold is estimated at US$57.05.4 This is comparable to the upper effective income threshold of the first quintile which is US$57.59. Second, the RGC's high-level social protection policy objectives are to reduce and prevent poverty, vulnerability, and inequality; and, the goal of the HEF is to improve access to public healthcare among the poor by eliminating OOPE. As there is evidence demonstrating financial vulnerability among Cambodia's second and third quintiles relating to health expenditure, our focus only on the first quintile can be considered a conservative approach [32]. Moreover, transient poverty, or those moving in and out of poverty from income shocks, affects 40–52% of the population in rural Cambodia [33-34].

This analysis was also limited by the classification of only two types of health expenditure in the past 30 days: transport and treatment. Other limitations include the provider-type groupings. Private and public sector groupings include a variety of provider sizes, notably hospitals and clinics/health centers with different implications on OOPE that correlates with level of provider. Analysis by provider type sub-groups was explored, however the sample size was insufficient to support robust results. To address the issue, hospital careseeking (or not) was included as a binary control variable.

In addition, transport costs was used as a proxy for distance to health provider. However, many unobserved factors can affect transport costs such as available transport options including the procession or not of a personally owned vehicle, household disposable income, cash availability, agency of the caretaker or care-seeker to expend disposable income, and perceived illness severity.

The HEF benefit package includes consultation, diagnostic tests, and medicines on the essential drug list including chronic non-communicable diseases. However, due to limited drug stocks at public health facilities these patients tend to be provided with drug prescriptions to purchase such medicines. For example, a recently published study on hypertension and diabetes found that patients first sought medical treatment with modern allopathic medicine, and in most cases, medicines were purchased elsewhere [35]. To limit the influence of this potential confounding factor, chronic disease was used as a control variable.

4.2. Interpretation

The primary purpose of the HEF is to improve access to healthcare for the poorest through reimbursement of user-fee exemptions at public health facilities [17]. However, an examination of OOPE among the poorest quintile rural patients seeking first-time health service in the public sector reveals that 67.2% pay, on average, US$11.61 [95% CI: $5.99–$17.22], after controlling for other factors. These findings are consistent with another recent assessment of spending for care seeking at public facilities [36]. OOPE among the first quintile poor at public facilities was found to be about 52% less compared to third quintile patients (p<0.01) after controlling for other factors. The difference between coefficients for the expected OOPE (zero) and actual among first quintile patients, was highly statistically significant (p<0.000). These findings are consistent with

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4 (KHR 149 524 * 150%) / 4100 = $54.70 US per capita * (1.01221 (2015 Consumer price inflation) * 1.03045 (2016 Consumer price inflation) = 1.043) = $57.05 US.

other studies that show HEF to be associated with reduced OOPE by about 57% among eligible poor people compared with non-poor people [37-38].

There are several possible explanations. First, as noted above, exclusion errors in the ID Poor system mean that only around 64-70% of the poor under the national poverty line are provided with an Equity card [21-22]. The post-identification system can help to mitigate the issue; however, beneficiary identification should be improved to minimize exclusion errors and systematically check that eligible people are enrolled.

Second, there is international and Cambodia-specific evidence of informal payments being deeply embedded in the healthcare system [22, 39]. HEF beneficiaries may be unaware that they should not pay, and thus do so. They may also pay for care to show appreciation or because they believe they will receive better services.

The decision to seek health care and the choice of provider is based on individuals' assessing and maximizing utility [40]. The exemption of user fees should act as an incentive to use public healthcare services, particularly among the poor who have higher demand elasticity. However, no evidence was found of increased utilization of public facilities among the poorest quintile compared to other groups. This suggests that the reduction of more than half of OOPE (compared to third wealth quintile patients) is insufficient to counterbalance the (perceived) negatives of public providers or the (perceived) positives of other providers. In addition, OOPE was found to have a negative effect on public sector care-seeking: a 0.5% decrease in probability with every US$10 increase in OOPE (p<0.02). Therefore, the reduction of OOPE is expected to improve access, and in turn increase demand for and use of public services.

Provider choice is also likely affected by other factors which were not accounted for. Provider reputation and patient satisfaction has been shown to be critical to attracting new patients [41]. In addition, low utilization of public facilities has been attributed to low perceived quality, an important determinant for public healthcare seeking among HEF beneficiaries [40, 42].

5. Conclusion and Recommendations

The results from this study show that HEF is not yet fully reaching its intended impact of removing OOPE as a barrier to access among the poor. In addition, free access to healthcare should incentivize utilization of public services; however, this study was unable to isolate such an effect among patients from the poorest wealth quintile. This suggests that the reduction of more than half of OOPE is not sufficient to increase public provider access among poor patients (compared to higher income patients). In addition, unobservable factors, such as quality perception or lack of information among beneficiaries. are likely influencing provider choice. Finally, as about 36% of people under the national poverty line do not hold an Equity card, enrolment exclusion is also likely impeding access to healthcare among the rural poor.

Service quality perceptions should be explored to better understand their effect on provider choice and aid in promoting use of public facilities. Access to healthcare can be strengthened with policy directives focused on increasing beneficiary information to further reduce OOPE. For example, current and new ID Poor households should be briefed on benefits and procedures to access the free care. Mass media and community mobilization activities can be used to promote community awareness about the user fee exemption. Existing systems used to verify services and possible payments by patients can be strengthened.

As mentioned, exclusion errors among the poorest can be reduced by relaxing the inclusion criteria and extending population coverage to vulnerable groups presently excluded. This should include second and third wealth quintile, informal sector households whose out-of-pocket health care costs exceed capacity-to-pay [32].

Patient demand is increasingly considered the key to driving improvements in healthcare service provision [43]. Social health protection schemes should be complimented with other health financing interventions demonstrating increased public health facility utilization and decreased OOPE when combined with HEF [38, 36]. Finally, monitoring of health service access- specifically service utilization, OOPE, and quality- should be strengthened by integrating appropriate indicators into national monitoring and evaluation systems.

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