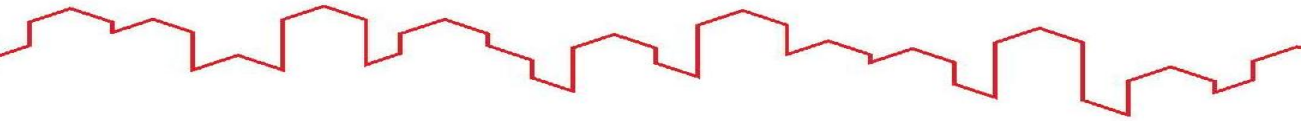

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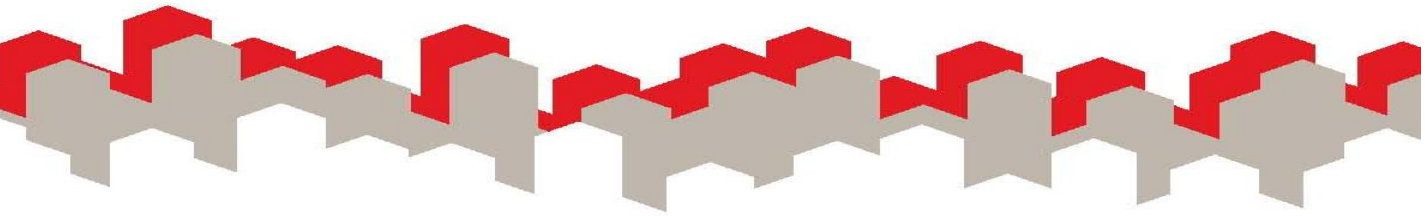

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Corruption and Health Insurance for the Informal Sector in Sierra Leone

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ABSTRACT

Most governments cannot provide the necessary health services required for their citizens either as a result of scarcity of resources or corruption (Mostert et al., 2012). Lack of credibility and trust in fund managers has been highlighted as one of the reasons why people do not join health insurance schemes in developing countries, especially in Africa (Escobar et al., 2010). This work investigates the impact of corruption on household's willingness to participate and pay for health insurance in the presence of corruption. To do so, we use (1) a binary logit model to study the relationship between household characteristics and experienced corruption; (2) an ordered probit model to explore how household characteristics are associated to the intensity of corruption perceived; and (3) a Mixed Logit model to estimate the association of corruption and participation and willingness to pay for a health insurance scheme. We find that corruption decreases the willingness to participate and pay for a public Health Insurance Scheme (HIS). Comparing experienced and perceived corruption, we observe that experienced corruption affects less WTP for a HIS than perceived corruption. Households *experiencing* corruption, are willing to pay more for a public HIS than those that perceive high levels of corruption. The implications of our findings are in line with the literature and stress the perverse spillover effects of corruption. Not only corruption hinders the effectiveness of health care systems and thus health outcomes, but it also undermines the willingness to pay for them and thus imperils the sustainability of health care systems in the countries that are most in need of them.

1. INTRODUCTION

One of the fundamental problems facing developing countries is the manner in which corruption has ravaged those countries (Mostert et al., 2012): it makes health care costly and unaffordable for most of the population; it has negative effect on patient care and morale of health care workers; and inefficient health systems with poor quality services, inequitable access and inadequate funding (Pieterse & Lodge (2015), Rispel et al (2016), Lewis (2007), TI (2006)). Corruption is often seen as a spill-over of government intervention that can negatively affect the provision of health care services (Acemoglu and Verdier, 2000; Agbenorku, 2012).

There are several definitions of corruption are used in the literature, namely: the abuse of office for personal gain (Klitgaard et al. 2000); the abuse of trust and the intentional violation of duty, motivated by gaining personal advantage, towards a party in need of a decision or service by a public servant (Alatas, 1986); and the abuse of entrusted power for private gain, in the form of bribery, extortion, manipulation of information in drug trials, overbilling, mis-procurement, diversion of medicines and supplies, and nepotism (TI, 2006).

Considerable evidence supports the point that unofficial payments are deeply entrenched in markets for health care in developing and poor countries. Studies also show that corruption within the health sector contributes significantly to the poor health situation in developing countries. A study of 71 countries by the World Bank (1997) revealed that highly corrupt countries (i.e. with high corruption indices) have higher infant mortality rates, even after adjustments for income, female education, health expenditure and urbanization. Another study by the World Bank on child death caused by malaria in rural Tanzania concluded that 80% of these cases went to modern health facilities but, to a large extent, were not cured due to corrupt practices. In as much as the effect of corruption in the health sector is clear, however, the overall cost of corruption is difficult to determine because of numerous problems including the difficulty of distinguishing between corruption, inefficiency and honest mistakes; the paucity of good record keeping in many countries, and the range of stakeholders in this sector. All these make determining the cost of corruption in the health sector cumbersome. In developing countries, corruption is rife in the health sector because it is hatched in the uncertainty of demand, and spreads to various other sub-sectors within the health system, thereby affecting almost all health care participants and stakeholders and hence creating expectations of bribes.

Health officials engage in corruption for various reasons, but key amongst them as discussed by Vian (2007) are: (1) officials must have opportunities like monopoly of services, discretion to make decisions, poor accountability and transparency in order for them to engage in corruption; (2) a conducive environment wherein society believes you have to be corrupt before you can make it and the erosion of public service values to ensure corruption thrives well; and (3) low salaries, personal financial debt and similar pressures force public officials to engage in corruption. Lewis (2007) explained that in developing countries, medical staffs are involved in under-the-table corruption because of the low and irregular payment of their salaries; lack of government action in the health care system and the culture of giving gifts.

Savedoff (2006) explains that the health sector is vulnerable to corruption because of the high uncertainty in health outcomes or demand for health services – issues like who will fall ill, when and what will they need. However, Olken and Pande (2011) argued that even though corruption is substantial in magnitude, it does not necessarily answer the question of whether it has a negative impact on economic activity. They further explain that the impact of corruption depends on whether the corrupt act can lead to an economic efficiency loss (or gain), which also depends on whether the deadweight loss from the bribes collected are greater (or smaller) than the equivalent deadweight loss from taxation needed to raise revenue to pay the equivalent amount of money in salaries were corruption eliminated.

Sierra Leone is not an exception to this problem. Corruption is one of the most important factors to have retarded growth in the health sector. Corruption in Sierra Leone's health sector ranges from demanding bribes for use of basic services to large-scale misuse of public goods for private gain by public officials (DfID, 2013). Along the Transparency International (TI) Corruption Perceptions Index (CPI) of 2017, Sierra Leone scored 30 out of 100 (where 0 is considered highly corrupt and 100 very clean) and ranked 130 out of 175 countries. A local survey by the Anti-Corruption Commission (ACC) in Sierra Leone (2010) shows that the majority of Sierra Leoneans have experienced corruption in one way or the other, with 94% classifying it as a problem. In March 2013, the ACC indicted 29 officials of the National Health Sector Support Project (NHSSP) at the Ministry of Health and Sanitation for various corruption offences regarding misuse of the Global Alliance for Vaccines and Immunization (GAVI) funds. The various charges amounted to $2,436,921.07.[1] Pieterse & Lodge (2015) opine that corruption scandals have plagued the Free

[1] Culled from the ACC website www.anticorruption.gov.sl on 12/11/2013.

Health Care (FHC) initiative in Sierra Leone. In 2009, an Amnesty International report in Pieterse & Lodge (2015) found that, in most areas, staff, whether paid or unpaid, would unilaterally and illegally charge fees and keep the money, which created a health care system that was often too costly for many Sierra Leoneans to access.

Studies (Rispel et al., 2016; Akokuwebe and Michael, 2017; Agbenorku 2012) agree that corruption within the health sector is serious and that something needs to be done urgently to solve it, or else the poor will continue to get poorer and their life expectancy shorter. However, before coming to this conclusion, it is important to assess the magnitude of the impact of corruption, which is the main contribution of this paper. The effect of corruption is likely to be large for poor people who cannot afford paying bribes or seeking private alternatives. The Public Affairs Centre (PAC) survey revealed that as much as 38% of total hospital expenses borne by households are in the form of bribes, and some 17% of households claim to have made unofficial payments to public hospitals (Paul, 1998 in Gupta et al., 2000).[2] A study by Gray-Molina et al. (1999) also revealed that people's perception of corruption in the health sector strongly correlates with input overpricing and unofficial payments.

The focus of this paper is twofold: first, we study the relationship between corruption, both perceived and experienced, and household characteristics. Second, we assess the impact of corruption on household participation and willingness to pay for a HIS. This paper is structured as follows. The next section outlines the methodology used followed by the econometric specification before analyzing the results. We then present the results and finally discuss and conclude.

2. **METHODOLOGY**

2.1 Study Area and Sampling

This study is carried out in Sierra Leone, a country of about 7 million people living along the west coast of Africa. The study uses data from a Discrete Choice Experiment (DCE) conducted by the authors in the northern and western regions of Sierra Leone (see Kamara *et al*, 2018; and Jofre-Bonet and Kamara, 2018).[3]

[2] PAC is a local agency in Bangalore, India that conducts public service delivery surveys

[3] When purposively driven by a researcher's prior knowledge and familiarity, the choice of study areas enhances the accuracy of the data and the econometric estimates obtained from it (Deaton and Paxson, 1997)

Statistics Sierra Leone (SSL) designed the sample needs and locations for this study based on a recent pre-census data that has information on settlement names, population and household sizes. A two-stage stratified random sampling method is used to identify the households. The first stage involves stratifying the population by region/district, and the second, by rural and urban location in each district. The purpose was to have a representative sample of informal sector households in both villages (rural areas) and major towns (urban areas). The choice of the household as the economic unit stems from the fact that the economic decision to purchase health care among these rural and mostly farming households is more likely to be a household rather than an individual decision.

2.2. Data Collection for the Discrete Choice Experiment

A Discrete Choice Experiment (DCE) method was used to collect the data. The DCE is an attribute-based measure of benefit/value (Ryan and Gerard, 2003). This survey-based data collection method is used to establish preferences for a HIS characteristics and levels of provision by allowing households to choose to participate or not in different HIS described with different traits, including cost (see Kamara *et. al*, 2018, for a detailed analysis of the DCE process). This allows to establish trade-offs between traits and levels of attributes.

The HIS attributes and their levels used in our DCE are below:

Table 1: Attributes and Levels used in the DCE

Attributes	**Attribute Levels**	**Description**
Coverage	Simple Moderate Comprehensive	Primary Health Care Diseases and Minor Operations Secondary Health Care Diseases and Major Operations Tertiary Care Diseases
Waiting Time	45 Minutes 60 Minutes 90 Minutes	The length of time one has to wait before seeing medical personnel
Choice of Provider	Private Public Faith-Based	Health centres and hospitals owned and operated privately Health centres and hospitals owned and operated publicly Health centres and hospitals owned and operated by faith-based organizations
Cost/Premium[1]	4000SLL (0.54USD) 6000SLL (0.81USD) 10000SLL (1.35USD)[4]	The monthly premium members will pay for the scheme

[4] The exchange rate used right through this work is at November 2016; $1 = 7400SLL and SLL means Sierra Leone currency

An additional questionnaire was used to collect information on the socio-demographic characteristics of households. Households' demographic characteristics were used to determine the relationship between corruption and household characteristics, their current health status and how they financed their health.

2.3. Data Collection

This study used an interviewer-administered questionnaire. Interviewers were recruited and trained on how to administer a DCE survey as described in Kamara et al. (2018).

Eight predominant informal sector activities were chosen for the survey: Petty Trading, Subsistence Farming, Commercial Bike Riding (Okada), Cattle Rearing, Fishing, Tailoring, Mining, and Quarrying. A total of 1,670 households took part in the initial survey. Due to failure to pass the dominance test and incomplete data during administration of the questionnaire, 1,458 households' data were used for the final analysis, which provided 39,366 observations for the analysis of nine choice sets with three alternatives.

2.4. Variables

Our survey has two measures of corruption: First, *perceived corruption* within the health sector on a scale of 1 (not corrupt) to 4 (highly corrupt), labeled as *perccorr*. Second, whether households have paid for treatments that should be free according to the Free Health Care (FHC) treatment Act (2010) for children under five years old, pregnant women and lactating mothers at public hospitals or health centres. We created a variable labeled *fhccorr* which takes value 1 if households say they paid for treatments and services supposed to be free and 0 otherwise. In the literature, paying for treatments that should be free is an indicator of actual corruption in the health care system (Olken, 2009). The reasons given by households in our sample on why they pay for treatments that should have been free were: being unaware that these services were free; the medical personnel requested the payment; they paid willingly; and other, less important, reasons.

Note, for the interpretation of our results, that these measures of corruption are at the household level, reflecting whether a household perceives (measure 1) or is subject to corruption (measure 2) in the health sector. It is not an attribute of a (un)chosen provider.

Other household characteristics are Income Per Capita (IPC); economic activity of the head (Petty Trading; Subsistence Farming; Okada; Cattle Rearing; Fishing; Tailoring; Mining; Quarrying); years of school of head; Distance to a Health Care Centre; age of the head; health shock; size; diseases experienced; location (rural or urban); receives remittances from abroad; the head listens to the radio and reads newspapers regularly as described in Table 2.

Additionally, as explained in Kamara *et al.* (2018), the dataset includes indicator variables reflecting the attributes of the health scheme being presented to the households in terms of cost, coverage, waiting time, choice of provider and their different levels as specified in Table 1. The choice of attributes varies with each health insurance alternative faced in the survey whereas the household's characteristics do not vary across the scenarios and would drop from a standard DCE estimation.

In order to capture how corruption affects household preferences over HIS attributes, we create two interaction terms using the corruption indicators and one key attribute presented, the HIS being provided publicly. This enables slope coefficients to differ between subgroups while preserving the variability in the attribute – level distribution (Hensher et al, 2005). The interaction variables are fhccorrpublic and perccorrpublic. Table 2 below presents the variables used in the analysis and their definitions.

Table 2: Variable Definitions[5]

Variable	Definition
Participation	Reported household's decision to participate in HIS; = 1 when answered Yes to participation and 0 otherwise.
FHC Corruption (*fhcorr*)	When the household reports that they pay medical expenses for a member in any of these categories: under-fives, pregnant women, and lactating mothers; = 1 when answered Yes and 0 otherwise.
Corruption Perception (*perccorr*)	The household's perception of corruption in the health sector (1) Not corrupt (2) Fairly corrupt (3) Corrupt (4) Very corrupt.
Cost	Amount to be paid for the HIS: 4,000, 6,000 & 10,000 SLL.
Coverage[1]	Coverage of the scheme: Simple, Moderate & Comprehensive.
Waiting Time	Waiting time to see a doctor/nurse: 45, 60 and 90 minutes.
Public Provider	Public Provider = 1 when visited and 0 otherwise.
Faith-Based - Provider	Faith Based Provider = 1 when visited and 0 otherwise.
Household Per Capita Income (PCI)	Calculated household per capita income in Sierra Leonean Leones (SLL) derived by dividing household income by household size.
Petty Trading	Reported type of informal sector = 1; 0 otherwise.
Subsistence Farming	Reported type of informal sector = 1; 0 otherwise.
Okada	Reported type of informal sector = 1; 0 otherwise.
Cattle Rearing	Reported type of informal sector = 1; 0 otherwise.
Fishing	Reported type of informal sector = 1; 0 otherwise.
Tailoring	Reported type of informal sector = 1; 0 otherwise.
Mining	Reported type of informal sector = 1; 0 otherwise.
Quarrying	Reported type of informal sector = 1; 0 otherwise.
School	Reported whether household went to school = 1; 0 otherwise.

[5]Moderate coverage is used as the definition of coverage in this work.

Distance to HC	Distance in miles from village to nearest health centre.
Age of Household Head	Age of head of household.
Shock	Reported shock to household's main informal economic activity = 1; 0 otherwise.
Household Size	Number of members in the household at the time of the interview.
Diseases	Whether any household member has suffered from malaria or typhoid fever in the three months prior to interview; yes = 1; 0 otherwise
Location	Household location: rural or urban; Urban = 1, Rural = 0.
Remittance	Whether household receives remittance from abroad; Yes = 1, 0 otherwise
News	Whether household head listens to radio or read newspapers; Yes = 1; 0 otherwise
Interactions:	
fhcorrpublic	Interaction term of the impact of FHC corruption on participation in a HIS that provides services through a public choice of provider; Yes = 1; 0 otherwise.
perccorrpublic	Interaction term of the impact of households' perception of corruption on participation in a HIS that provides services through a public choice of provider; Yes = 1; 0 otherwise

3. Econometric Estimation Strategy

We estimate three different models: The first two models estimate how household characteristics are associated with the likelihood of the household perceiving corruption (*perccorr* is the dependent variable*);* and with the household having experienced actual corruption (*fhcorr*)*, i.e.* households paying for treatments that should be free*.* The third model examines how corruption influences the choice of the type of HIS.

Since *fhccorr* is a binary variable (yes or no) and *percorr* is an ordered categorical variable with 4 levels, we apply a logit model to estimate the model that has *fhcorr* as dependent variable and an Ordered Probit model for the *perccorr* model*.*

To estimate how corruption influences the choice of the type of HIS, we use a DCE relying on the DCE literature summarized by Ryan and Gerard (2003). Given the attributes of the HIS and the levels of their service/characteristics, the estimation is based on drawing independent samples of potential HIS scenarios from the full factorial set (as explained in Kamara et al., 2018). To estimate the model DES, one relies on the idea that individuals decide based on the comparison of the indirect utility functions associated to the different HIS choices. The individual will chose HIS *A* with indirect utility $U_{iA} = v_{iA} + \varepsilon_{iA}$ if this utility is higher than that of HIS B ($U_{iB} = v_{iB} + \varepsilon_{iB}$). The indirect utility v_{ij} is the measurable component of HIS *j* and can be estimated while the error term cannot be observed. Nevertheless, we know that if the individual chooses HIS A over B, then $(v_{iA} - v_{iB}) > (\varepsilon_{iB} - \varepsilon_{iA})$, which gives a probability model to be estimated:$P(A_i) = P((\varepsilon_{iB} - \varepsilon_{iA}) < (v_{iA} - v_{iB}))$. The linearized utility function that defines household *i's* participation in the HIS *j* is given in the equation below:

$$U_{ij} = \beta_0 + \beta_{1i} Cost_j + \beta_{2i} Cov_j + \beta_{3i} Wait_j + \beta_{4i} Pub_j + \beta_{5i} Cont_j + \beta_{6i} corr\_pub_j + \eta_{ij} + \varepsilon_i \quad (1)$$

where β_0 is the intercept and $Cost_{ij}$, Cov_{ij}, $Wait_{ij}$, Pub_{ij} , and $Cont_{ij}$ are attributes of HIS *j*. $Cost$ is cost of scheme; Cov takes value 1 when HIS *j* provides moderate coverage; $Wait$ is waiting time associated with HIS *j*; Pub takes value 1 if HIS *j* is offered by a public provider; and $Cont$ takes value 1 if HIS *j* belongs to a faith-based provider. We interact the two variables of corruption (actual and perceived) and choice of public provider, $corr\_pub_{ij}$, as previous work highlighted that households were willing to pay less for public provider hospitals or clinics due to their high level of corruption (Kamara et. al 2018). The error term η_{ij} captures the unobserved correlation between HIS alternatives for household *i,* and, finally, $\varepsilon_{i.:}$ is an *iid* error term. We estimate discrete choice models using Mixed

Logit Models (MXL).[6]

In a DCE model, coefficients indicate the relative importance of each attribute. The sign of a coefficient reflects whether the attribute has a positive or negative effect on utility. The trade-offs that respondents are willing to make between attributes can be estimated by the ratios of the coefficients (Ryan et al., 2003). For instance, the ratio of the coefficients of coverage versus public provider, *Cov/Pub,* represents an estimate of how coverage the respondent is willing to accept or be willing to forsake in order to have a public provider as opposed to another type. The value of the coefficient of *Cost* is used to estimate the WTP for another attribute. For example, the WTP to avoid a longer wait can be obtained by dividing the coefficients of waiting and the negative of that corresponding to its cost, i.e. *Wait/-Cost,* as the coefficient of *Cost* represents the importance of a change in cost. As explained, one can also introduce interaction terms in the regression model to assess whether a combination of attributes subtracts or adds to the WTP for a HIS' particular attribute.

4. RESULTS

This section presents the results of the analysis in the form of descriptive statistics, estimates of the effect of household characteristics on the likelihood of actual and perceived corruption, and of scheme characteristics on the likelihood of participation in given schemes.

4.1. Data Summary and Descriptive Statistics

Table 3 below presents descriptive statistics of the socio-demographic characteristics of households to experienced corruption, *fhcorr,* and to the level of perceived corruption, *perccor,* in the health sector.

As shown in Table 3, about two thirds of the households sampled are engaged in the economic activity of Petty Trading, Subsistence Farming, or Okada Riding. Over 70 percent of households prefer going to the health centre or hospital for treatment whenever sick. About 96% of households responded they paid for FHC services even though they were meant to be free. From the households sampled, when asked why they paid for FHC that was free, 52% responded they were asked to pay, 38% responded they were unaware they should not pay while another 6% responded they paid willingly.

About 44 percent of those who paid for FHC and of those who perceived high levels of corruption in the health sector live in urban areas. Six out of ten households that paid for FHC services and perceived high corruption had been to school.

[6] The user written Mixlogit command by A.R. Hole (2007) is applied for the MXL model using the statistical software STATA version 13.1.

Table 3: Descriptive Statistics

Variables	Description	Main Sample	Yes FHC Corruption	Perceived High corruption
Informal Sector Activity	Petty Trading	27.0%	24.9%	24.7%
	Sub Farming	19.8%	24.5%	22.8%
	Okada	22.4%	20.5%	21.5%
	Cattle Rearing	4.9%	5.8%	4.9%
	Fishing	7.8%	6.1%	8.7%
	Tailoring	10.5%	11.3%	11.8%
	Mining	3.7%	3.6%	3.5%
	Quarrying	3.9%	3.3%	2.3%
Type of Treatment	Self	2.7%	1.9%	2.2%
	Traditional	2.5%	2.7%	2.5%
	Health Centre	48.8%	40.6%	55.7%
	Hospital	24.7%	31.7%	19.3%
	Drug Peddlers	8.1%	7.8%	8.7%
	Pharmacy	13.1%	15.2%	11.7%
Why Pay for FHC	None	0.1%	0.2%	0%
	Unaware Free	37.6%	37.6%	35.9%
	Asked to Pay	51.9%	51.9%	50.9%
	Paid Willingly	6.0%	6.0%	7.5%
	Others	4.5%	4.5%	5.7%
Location	Urban	47.5%	44.8%	44.6%
	Rural	52.5%	55.2%	55.4%
School	Went to School	67.5%	62.6%	69.8%
	Did Not	32.5%	27.4%	30.2%
Number Households		**1458**	**957**	**923**

4.2. Relationship between corruption and household characteristics

This section studies the relationship between actual corruption (*fhcorr)* and household characteristics. We use logit models as households respond 'Yes' or 'No' to the question on whether they paid for services free for children under 5 years, pregnant women and lactating mothers.

Table 4: Experienced corruption and household socio-economic characteristics – Logit Model

Dependent variable:	**FHC[1] Corruption (*fhcorr)***	
Variables	**Coefficients (Standard Errors)**	**Odds Ratio (Standard Errors)**
Petty Trading[2]	0.28921	1.3354
	(0.07075)***	(0.0945)***
Subsistence Farming	0.59757	1.8177
	(0.07335)***	(0.1333)***
Okada	0.36694	1.4433
	(0.07199)***	(0.1040)***
Cattle Rearing	0.66548	1.9454
	(0.08674)***	(0.1687)***
Fishing	-0.04902	0.95216
	(0.08124)	(0.0774)
Tailoring	0.48688	1.627228
	(0.07728)***	(0.1258)***
Mining	0.34541	1.4126
	(0.09349)***	(0.1321)***
Household IPC	-0.41695	0.6591
	(0.03125)***	(0.0206)***
Distance H Centre	-0.02889	0.9715
	(0.00495)***	(0.0048)***
School[3]	-0.35640	0.7002
	(0.03087)***	(0.0216)***
Urban[4]	0.00479	1.0093
	(0.02824)	(0.0285)
Age of Household Head	-0.00479	0.99521
	(0.00122)***	(0.0012)***
Diseases	0.18261	1.2003
	(0.03079)***	(0.0370)***
Remittances Received	1.62e-06	1.0000
	(1.09e-07)***	(1.09e-07)***
News	0.52638	1.6928
	(0.03422)	(0.0579)***
Constant	3.88735	

	(0.37462)***	
No of Observation	26244	26244
No of households	1458	1458
Wald Chi2 (15)	-1127.26	1127.26
Prob >Chi2 (k-1)	0.0000	0.0000
Pseudo R2		0.0348
Log likelihood	-17372.241	-17372.241

1. FHC stands for Free Health Care Corruption. 2. The reference sector is quarrying. 3. No School is the base.
4. Rural is the reference location used. Significance levels indicated by stars: *** p<0.01; ** p<0.05; * p<0.1.

All variables in Table 4 apart from the economic activity of Fishing are statistically significant. Thus, the probability of a household paying health services that should have been free is significantly and positively correlated to whether the household is receiving remittances, suffering from diseases (malaria or typhoid), living in an urban area, and the household head listening to news. On the other hand, there is a negative correlation with distance to the Health Centre, school, and the age of the household head.

Table 4 above also presents the odds ratio and relative risk analysis of the relationship between actual corruption and households' characteristics. The odds for answering yes to *fhcorr* is about 1.6, 1.8 and 1.9 times more likely for households whose primary economic activity is either Tailoring, Subsistence Farming, or Cattle Rearing respectively, than those whose economic activity is not among these, i.e. households involved in these three sectors are more likely to have paid for services considered to be free. The household living in an urban location and whether the household head receives remittances do not finally change the odd ratio, i.e. their odds' ratios are close to 1.

4.3. Perceived corruption and household characteristics

Households were also asked to choose from a scale of 1 to 4 (not corrupt to highly corrupt) how they perceive corruption in the health sector. Using an Ordered Probit model we study the relationship between households' perception of corruption in the health sector and their socio-demographic factors. As each household had four options to choose from in a sequential order from low to high, the use of the Ordered Probit model is justified.

Table 5 presents the marginal effects of a change in household's perception of corruption as a result of a change in our independent variables, and their standard errors.

Table 5: Perceived corruption and household characteristics - Ordered Probit

Dependent Variable:	**Household Corruption perception *(percorr)***			
Levels:	**Not Corrupt**	**Less Corrupt**	**Corrupt**	**Highly Corrupt**
Variables	Marginal Effects (Standard Error)	Marginal Effects (Standard Error)	Marginal Effects (Standard Error)	Marginal Effects (Standard Error)
Subsistence Farming[1]	-.038594 (.0035521) ***	-.0525049 (.0050194) ***	.0004883 (.0007412)	.0906106 (.0086617) ***
Okada	-.0071988 (.0035093) ***	-.0082131 (.0040254) *	.0012384 (.0006009) *	.0141735 (.0069424) **
Cattle Rearing		-.008552	.0012794	.0147571

Fishing	-.0074845 (.0058888)	(.0069052) *** -.0859871	(.0009047) -.0075644	(.0118986) .1499487
Tailoring	-.0563972 (.0035448) ***	(.0061474) *** -.0579447	(.0019096) *** -.000396	(.0108448) *** .1001155
Mining	-.0417748 (.0036374) ***	(.0054485) *** -.0053006	(.0009889) .0008536	(.0094416) *** .009154
Quarrying	-.004707 (.00677)	(.0077632) .0715158	(.0011438) -.042249	(.0133923) -.1375149
	.1082481 (.0100751) ***	(.0043637)***	(.0047826)***	(.0095394) ***
HH IPC	.0461239 (.0027945) ***	.061009 (.0037199) ***	-.0022392 (.0005898) ***	-.1048934 (.0062495) ***
Dist. to HC	.0101954 .000453) ***	.0134857 (.0006037***	-.000495 (.0001284) ***	-.023186 (.000997) ***
Schooling²	-.0659464 (.0032313) ***	-.0763381 (.0033112) ***	.0096378 (.0010212) ***	.1326466 (.0056162) ***
Urban³	.0213245 (.002759) ***	.0279808 (.0035922) ***	-.0011536 (.00031) ***	-.0481517 (.0061599) ***
Age of HH Head	-.0006112 (.0001053) ***	-.0008085 (.0001393) ***	.0000297 (9.13e-06) ***	.00139 (.000239) ***
Diseases	-.0345979 (.00256) ***	-.0457633 (.0034074) ***	.0016796 (.0004483) ***	.0786813 (.0057622) ***
Remittances	-4.97e-08 (9.10e-09) ***	-6.57e-08 (1.21e-08) ***	2.41e-09 (7.62e-10) ***	1.13e-07 (2.07e-08) ***
News	-.0327223 (.0028734) ***	-.0432825 (.003825) ***	.0015886 (.000432) ***	.0744159 (.0064904) ***
N observations	26244	26244	26244	26244
N households	1458	1458	1458	1458

1.The reference sector is Petty Trading. 2. No school is the base. 3. Rural is used as the reference location

Significant levels indicated by stars: *** p<0.01; ** p<0.05; * p<0.1.

Household's IPC, distance to the health centre, and living in an urban location positively influence the household's perception that health care is not or not much corrupt (first two columns). And these variables have a negative effect on perceiving the health care system as quite corrupt or very corrupt (columns 3 and 4). Schooling, age of household head, diseases, receiving remittances and the head listening to news decrease the likelihood of perceiving no or low levels of corruption and increase that of perceiving high levels of corruption.

Looking at the coefficients in detail, the probability of reporting the health sector as not corrupt and little corrupt is positive for all informal economic activities compared to Petty Trading, but not for Fishing, the only sector positively associated with perceiving no or low corruption and negatively associated with quite or high corruption levels. For all others, it is the other way around.

Distance to a Health Care Centre significantly influences household's perception of corruption. Each additional kilometer to the nearest Health Care Centre is associated to an increase of 1.02 percentage points in the likelihood to class the health system as not corrupt and it decreases the likelihood of perceiving as highly corrupted by 2.31 percentage points.

For households in which heads went to school, one additional year of schooling significantly decreases the household's likelihood of perceiving no corruption in 6.6 percentage points and increases the likelihood of perceiving it as very corrupt in 13.2 percentage points. Households where the head reads

a newspaper have a similar association to perceived corruption to that of schooling. In sum, education and reading newspapers are associated to a more pessimistic perception of the health care system, i.e. more likely to be corrupted.

In addition, having suffered from malaria or typhoid fever is associated with an increase of 7.9 percentage points of the likelihood of perceiving the health sector as highly corrupt, and correspondingly, it is negatively associated to perceiving it as no or lowly corrupted.

The result also shows that household's income per capita (IPC) is positively associated to the household perceiving the health sector as not corrupt. An extra 10 percent increase in the households' IPC is associated with an increase of 4.6 percentage points in the likelihood of perceiving health care as not corrupt and 10.5 percentage points less likely to perceived it as very corrupt.

4.4. Corruption and households' participation in health insurance

We now turn to studying the association between corruption and households' participation in a HIS by using Mixed Logit models[7] (MXL) to estimate equation (1). Data were collected on the HIS attributes (coverage, cost, waiting time and choice of provider), corruption and participation in HIS. The study makes use of 500 Halton draws for each sampled household to generate their simulated probability.[8]

Table 6 below presents the estimation results of the MXL model for the main sample. The mean coefficients of the estimates are presented alongside their standard deviations.

The attributes of HIS have the expected effects. The attribute *Cost* has a negative sign, implying that the probability of participating in a HIS goes down as cost rises. *Coverage* and *faith-based provider* are significantly and positively associated to the likelihood that the household will participate in the HIS. There is a strong preference in Sierra Leone for faith - based providers based on the observation that providers are reliable as they have very good doctors. There is also a positive significant effect on participating in a HIS if the provider is public.

As explained, in order to understand how perceived or experienced corruption of a health care provider impacts the household's likelihood participation in a HIS, we interact the measures of perceived and actual corruption with the HIS being provided by a public provider.

Table 6: The Impact of Corruption on Households' Participation in Health Insurance – Mixed Logit Model Result

	Participation in Health Insurance FHC Corruption		**Participation in Health Insurance Perceived Corruption**	
Variables	**Mean (SE)**	**SD (SE)**	**Mean (SE)**	**SD (SE)**
Cost	-0.00003 (5.18e-06)***		-0.00003 (5.18e-06)***	

[7] For better explanation of the MXL model see McFadden & Train (2000) and Hole (2013).

[8] This work used 500 Halton draws because it is the most widely used number of draws and, as Train (2000 & 1998) explains, a large number of draws are needed in most cases to assure reasonably low simulation error in the estimated parameters.

Coverage	0.36598	0.39426	0.36714	0.39376
	(0.01913)***	(0.02711)***	(0.01914)***	(0.02711)***
Waiting Time	-0.00677	0.03169	-0.0068	0.0316
	(0.0011)***	(0.001)***	(0.0011)***	(0.00098)***
Public Provider	0.07325	0.08236	0.11276	0.07196
	(0.03873)*	(0.13421)	(0.06451)*	(0.13214)
Faith-Based	0.6919	0.55507	0.69372	0.565288
Provider	(0.03505)***	(0.04972)***	(0.03517)***	(0.0503)***
fhcorrpublic	-0.02934	0.43805		
	(0.00718)***	(0.088)***		
perccorrpublic			-0.02054	0.01685
			(0.02681)	(0.05799)
HI Scheme 1	3.32962		3.32085	
	(0.09704)***		(0.09699)***	
No of Observation	39366		39366	
No of households	1458		1458	
LR Chi2 (k-1)	2373.56		2375.98	
Prob > Chi2 (k-1)	0.0000		0.0000	
Log likelihood	-9762.8307		-9761.4837	

Notes: SE stands for Standard Error. SD stands for Standard Deviation.
*** Significant at 99% confidence level; ** Significant at 95%; and * Significant at 90%.

Using Table 6, we can compare the impact of experienced and perceived corruption on participation in a HIS publicly provided. The negative coefficients of both interaction terms *fhcorrpub* and *percorrpub* indicate that households having experienced or perceived corruption are less likely to participate in a publicly provided HIS as compared to households that have not experienced or perceived corruption. The coefficient of *fhcorrpub* has a large negative and significant effect on the participation in health insurance by public providers but the coefficient of *percorrpub* is not statistically significant. Otherwise, the two models show similar results in that all other variables are statistically significant and most coefficients exhibit substantial preference heterogeneity as shown by their statistically significant standard deviations. In particular, the results indicate that, on average, the likelihood of households participating in a HIS is higher when the cost of the scheme and waiting time are low.

4.5. Willingness to Pay to Participate in Health Insurance

The impact of corruption on a households' participation in health insurance can also be interpreted in terms of households' WTP to participate in a publicly provided HIS if there is experience or perception of corruption. As explained in section 3, we can use the coefficient of *Cost* to calculate the WTP for any other attribute by dividing the coefficient of interest by the negative of the cost coefficient (Ryan et al, 2003, for a summary). Thus, in this case, the estimated WTP to participate in a publicly provided HIS is SLL 3,758 (i.e., 0.07325/0.00003) as per the coefficients of *Public Provider* and *Cost* in first model, and SLL 2,441 (i.e., 0.11276/0.00003) as per the corresponding coefficients in the second one. Also, we can calculate the detriment in the WTP for a publicly provided HIS when the

household has experienced (SLL -978.00) or perceived (SLL - 684.67) corruption.

We can conclude that, although the WTP to pay for a publicly provided HIS is positive according to our estimates, having experienced or perceiving corruption in the health care system makes households WTP considerably less than a situation without corruption.

Table 7 WTP[1] for a publicly provided HIS in the presence of corruption

	Public HIS	Interaction public HIS and corruption	Total WTP for public HIS if corruption present
Model 1 - experienced corruption	3,758	-978	2,780
Model 2 - perceived corruption	2,441	-684.67	1,756

Notes: The WTP figures are in the local currency - Sierra Leonean Leones (SLL).
[1]WTP to participate in a publicly provided HIS for a reduction in corruption.

Table 7 also shows that the WTP in a publicly provided HIS is about 63% higher (1,756/2,780) when the household has experienced corruption than when corruption is perceived. This is in line with the literature showing that respondents are WTP more for HIS in response to having experienced corruption than just perceiving it (Chetwynd et al. 2003; Rose-Ackerman 1997; Kenny 2006).

5. DISCUSSION AND CONCLUSION

This paper studies the relationship between household characteristics and having experienced and perceiving corruption using Logit and Ordered Probit models. Further, we analyse the association between household's experienced and perceived corruption and the likelihood to participate in a HIS and the detriment on the WTP for a publicly provided HIS that these two measures of corruption have.

Our findings indicate that the probability of a household having paid for health services that should have been free (experienced corruption) is significantly and positively correlated with the household receiving remittances; suffering from certain diseases (malaria or typhoid); living in an urban area, and the household head listening to the news. Distance to the Health Centre, the household head having attended school, and the age of the head are negatively associated with having experienced corruption.

In terms of perceived corruption, there is a positive association between almost all informal economic activities sectors (except for Fishing) as compared to Petty Trading and perceiving high corruption in the health sector. Household's income per capita, distance to health centre and urban location are negatively associated to perceiving high corruption in the health care sector. On the other hand, household's income per capita appears to make less likely to perceive corruption.

We also learn that households prefer to participate in HIS and that, in particular, participation in a HIS

becomes more likely with better coverage and when the provider is faith-based, but becomes less likely with higher cost and waiting time.

Our results also point out that having experienced or perceiving corruption in the health care system makes it less likely to participate in a publicly provided HIS. Moreover, we find that experienced corruption has stronger impact than perception on the likelihood to participate in a HIS, which the literature had already pointed out. Further, Olken (2009) raises the question of how individuals form their perceptions and, thus, how accurate reported perceptions actually are.

Even further, our findings clearly show the detrimental spill-over costs of corruption in the health care system in countries such as Sierra Leone. Not only corruption may make a health care system inefficient and even wasteful but it also seems to undermine the public's trust in the institutions: the WTP of households to participate in a publicly provided HIS declines when households have perceived or experienced corruption.

These conclusions have strong implications as efforts to create HIS that can bring health care services, essential medicines, and medical equipment to those who need it will be not fully supported by the public unless there are initiatives to curb corruption.

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