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## **Household health-seeking behaviour in Khartoum, Sudan: The willingness to pay for public health services if these services are of good quality**

Khalid Habbani<sup>a</sup>, Wim Groot<sup>a, b</sup> and Izabela Jelovac<sup>a</sup>

### **Abstract**

In this paper, we analyse the extent of willingness to pay for good quality public health services in relation to the demographic and socio-economic characteristics of respondents. The analysis was carried out by way of a household survey conducted in Khartoum, Sudan in 2001. We studied willingness to pay by means of a contingent valuation method. A logistic regression model was used for the statistical analysis. The results show that the overall percentage of people who are willing to pay for good quality public health services is either 80% or 75% depending on whether respondents already pay for these services (group 1) or not (group 2). They show that although the two groups are willing to pay for good quality public health services, the demographic characteristics that affect the willingness to pay differ between the two groups. The results of the logistic regression analysis for each group are remarkably similar. We conclude that if the quality of services is improved, reasonable fees could be set. This supports the continuity of the policy to recover costs because virtually the majority of the households would be willing to pay reasonable fees.

**Keywords:** Willingness to pay; Public health services; Good quality; Contingent valuation; LRM; Sudan

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## **1. Introduction**

Despite its recent classification as a middle-income oil importer Sudan's economy is underdeveloped. Since the late 1970s Sudan has been experiencing an economic crisis [1]. In addition, there have been significant cutbacks in external funding and donations. The World Bank and the International Monetary Fund have ceased their operations in the country [2]. The poor economic conditions in Sudan have eroded the resources needed for the government to provide minimally acceptable healthcare services. As in other Sub-Saharan countries, the long-standing free of charge health services to the entire population has had negative impacts on the whole system [3]. In addition, the slow development of financial institutions and formal wage sector employment has limited the potential for health insurance to grow and has delayed the start-up of the private health sector [3].

In its quest to establish a sustainable solution for the financing of health services the government initiated the Health Insurance Act, which was approved by the National Assembly in 1995 [4]. According to the act, insurance is compulsory for all residents in the republic of Sudan. The contribution is income-related and amounts to 10% of the salary for the formal sector (4% paid by the employee and 6% paid by the employer). Health services are provided through the public sector freely for the insured except for 25% of the drug expenses. Although the vast majority of the population (more than 80%) is not employed in the formal sector no clear plans have been devised for insurance for the informal sector [5]. The informal sector is composed of the self-employed, non-employed, the poor, etc. This sector is facing many questions concerning people's income, affordability, willingness to pay, collection of contributions and provision of health services. It will be very difficult to establish a health insurance scheme without answering these questions.

In 1992 Sudan started a new policy of Economic Liberalization. This encouraged and extended cost-recovery policies for the health sector, which imposed user charges for publicly provided healthcare services. In response to the Economic Liberalization policies the private sector expanded tremendously. A free market for health services including NGOs appeared but without private health insurance which is not yet established. One of

the main factors that encouraged the private provision of health services was the perceived deterioration of the quality of services provided by the public health facilities. In addition, the introduction of charges for the publicly provided health services made the ratio of quality/cost more favourable for the private services, as the higher user charges in the private sector are compensated by its high quality [6].

In the years 1996 and 2000 the government decided to provide free of charge health services at emergency departments and inpatient wards. These steps were taken under the pressure of expanded poverty and the political situation. The expansion of poverty has led to deficient health services and an uninsured informal sector. Protests took place against the negative impacts of the Economic Liberalization's new policies i.e. the rapid growth of the private sector that favours the rich. This opened the debate again about these cost recovery policies and their usefulness for the Sudan. An answer to the question "Are people willing to pay for public health services if these services are of good quality?" will provide guidelines to help health planners in establishing an adequate health financing system in Sudan.

This paper aims at providing and discussing a broad study on the willingness to pay (WTP) for improving the quality of public health services in Khartoum in Sudan. The WTP is made operational by the contingent valuation method. The WTP for public health services is conditional on the improvement of the quality of health services in terms of: (a) specialist services, (b) advanced laboratory and X-ray unit analysis, (c) availability of drugs and consumables especially for children and (d) decreased waiting time. The paper uses a logistic regression model (LRM) to examine the WTP in relation to the demographic and socio-economic characteristics of respondents. Further the paper aims to explore the differences in WTP between the respondents who already pay for the health services (group 1) and those who do not (group 2).

The paper is organized as follows: Section 2 presents a short description of the cost-recovery policies in Sudan. The statistical methodology is presented in Section 3. Section 4 contains the interpretations of the results and the discussion. Section 5 concludes with policy suggestions for the healthcare system in Khartoum in Sudan.

## **2. Cost-recovery policies in Sudan**

During the 1980s and early 1990s Sudan responded to a number of international health initiatives to strengthen its health system: The World Bank 1987 Agenda for Change, which advocated user fees and considered the health services as a private good; the Bamako Initiative with its community financing tool<sup>1</sup>; the Harare Declaration on decentralization; and the World Development Report in 1993 with its focus on the minimum essential services package [7]. In 1992 Sudan launched new Economic Liberalization policies, which are influencing the expansion of the cost-recovery policies in public facilities and encouraging private sector growth.

Community participation in the design of the cost-recovery schemes is the main mechanism for achieving financial compatibility. In addition it helps to ensure benefit packages that are socially and culturally acceptable to the community [8]. User charges may be one way to improve the sustainability of financing public health services in Sudan. It has been used in other countries with more or less success [9] and [10]. Moreover, one study shows that people are willing to pay the higher prices of the private sector in return for good quality health services [11]. Sudan, like other developing countries, cannot allocate enough money for financing its health services but neither can the majority of the population afford to fill this gap [12]. User charges have a negative effect on equity. Fees tend to impose a barrier on the poor to use services. Some studies show the role of the nature of payment mechanisms on equity i.e. systems that employ a pure user charge are more likely to influence inequality than those with exemptions or risk sharing schemes [12]. No studies of the negative impacts of the user charge policies on equity have been held in Sudan but, as has been mentioned before, the debate on these issues was recently opened again in the Sudan.

According to Curries, cost-recovery policies are the foundation for health insurance schemes and the transition towards privatisation [13]. Cost-recovery policies are expected to support the sustainability of the health financing system. They also allow the government to reallocate expenditure from curative services to public health activities that have a broader beneficiary base. Moreover, they are expected to reduce the private sector's price disadvantage relative to the government sector, and encourage the

expansion of the health insurance schemes for the formal and the informal sectors [14]. They are also expected to stop the widespread misuse of and drain on medical supplies by citizens and health workers [15].

### **3. Methodology**

#### **3.1. Survey data**

The data obtained in the survey were collected through interviews based on an adapted questionnaire in Arabic. The questionnaire was pre-tested and retested after correction and modifications. The survey was conducted in 2001 in Sudan by a trained team following the pre-tests.<sup>2</sup> The team was based in middle Khartoum, joining the Ajaweed Society research department.<sup>3</sup>

The survey was held in Khartoum, the capital of Sudan, and covered urban, suburban and rural areas. The samples were selected by a multi-stage sampling procedure, i.e. first, a selection of the three towns of the capital Khartoum (Khartoum, Omdurman and Bahary) was made. Second, each of these towns was divided into central, peripheral and rural areas. We made a random selection of localities in the central, peripheral, and rural areas, then a random selection of neighbourhoods and finally a random selection of households for the purposes of the survey. As planned, 460 households were contacted and none of them refused to respond. For the purpose of similarity and to increase the internal consistency of the sample, 10 questionnaires were dropped. This meant that the overall respondents' rate is 100%, which suggests high evidence of reliability. The survey targets the heads of households (HH), or their nearest relation. The survey includes questions on the respondents' age, gender, tribe, origin of HH, family size, education, occupation, and place of work. The respondents were asked a set of questions on their socio-economic position that included income and expenditure. With regard to income, the respondents were asked about their monthly income and any other income. Some studies use monthly income to categorize households as poor, rich or others [16]. We classified the respondents' monthly income in an ordinal manner, as shown in Table 1. The currency

used in this paper is the Sudanese Pound (Ls).<sup>4</sup> Monthly income in developing countries is not considered as a sufficient indicator for the household's economic status.

**Table 1: Classification of the respondents monthly income**

<b>HH monthly income (Ls)</b>	<b>Classification</b>
<100000	Very low income
100000–150000	Low income
150000–300000	Moderate income
300000–500000	High income
>500000	Very high income

To collect additional information on their wealth, the respondents were asked whether they owned one of the following durable goods: a refrigerator, a car or a house. To examine their health condition the respondents were asked to determine the number of sickness episodes, visits to health facilities and the number of prescriptions during the last 3 months. To examine the accessibility of health services the respondents were asked how far the nearest pharmacy is from their residence. They could choose between walking distance and driving distance. In addition, a question on the choice of one pharmacy is included. The respondents were asked a set of questions regarding their payments for the health services during the last 3 months. These were: whether they had paid any amount of money for health services, and whether they had bought drugs for themselves or any members of their household.

### **3.2. The contingent valuation method**

The contingent valuation method is frequently applied in developed countries, but not in developing ones [17]. The validity and reliability of these methods are not yet well established, so the results should be interpreted with some caution [18]. The healthcare systems in developed countries offer a good environment for conducting these studies and results are used to increase the efficiency of healthcare delivery. In developing

countries the high illiteracy rate and poor institutions do not contribute to a good environment for conducting such studies. As far as we know no similar studies have been held in Sudan. The transition towards privatisation, economic liberalization and towards building institutional facilities encouraged us to use these methods to analyse people's willingness and ability to pay (ATP) for these transformations in healthcare provision. Uncertainty about household income, the Sudanese dislike of bargaining over prices, the well known prices of the private sector and its relation with quality together with the bias of the starting price of the bidding game method made us decide to use the take-it-or-leave-it method. The prices presented in Appendix A for the two groups were constructed from the current costs of the public health services. Prices varied around the estimated cost of the improved quality facilities and are close to the private sector's prices. In developed countries, willingness to pay corresponds closely to the ability to pay, which is not the case in developing countries. Instead of asking the respondents to give a yes or no answer, we offered them four options. The aim of this was to get some insight into the differences between willingness to pay and the ability to pay. For example, the response 'I would go into debt' is a strong indicator of willingness to pay but a weak indicator of ability to pay. Table 2 shows these differences. We also aimed to overcome possible strategic behaviour biases, e.g. the response 'if I have enough money' is used to overcome the risk of respondents making a pledge they cannot keep.

**Table 2: Differences between WTP and ATP related to the answers in the take-it-or-leave-it method**

Answers	WTP	ATP
I would not hesitate	+++	+++
I would go into debt	++	-
If I have enough money	+	--
I would not pay	---	---

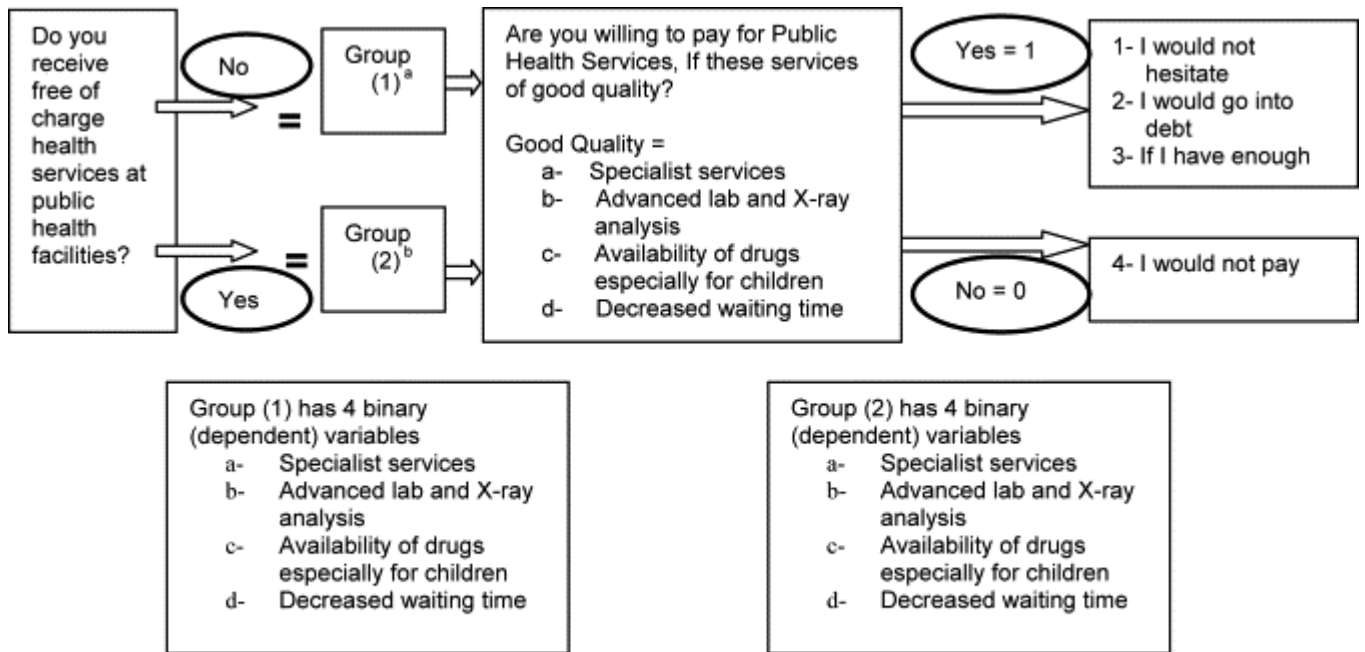
(+) high, (-) low.

Because of the dichotomous nature of the responses the model chi-square was used as a reliability test. The most common test of reliability is the amount of variance explained



by the variable. A significant level of less than .05 indicates that the likelihood of the observed responses – given the estimated equation – is significantly greater than their likelihood given an equation without independent variables. Results reported in Appendix B show that the contingent valuation method is reliable [19].

For the purpose of this paper – which investigates only the respondents' WTP – we considered the upper three options as WTP. For the analysis of ATP see [20]. To examine their willingness to pay for public health services, the respondents were divided into two groups according to their answers to the question 'do you receive free of charge public health services?' (more information about the group who is entitled to free of charge public health services can be found in [21]) The respondents who answered no were classified into group 1. Because they already pay for public health services, they were asked a set of questions to investigate their willingness to pay an extra amount of money if these services were of good quality. The respondents who receive free of charge public health services were classified into group 2. They were asked a set of questions to investigate their willingness to pay for public health services if these services were of good quality (Appendix A shows the contingent valuation scenario). Four aspects of health services were selected to represent good quality: (a) specialist services, (b) laboratory and X-ray unit analysis, (c) availability of drugs, especially for children and (d) decreasing waiting time. The possible answers to investigate their willingness to pay for good quality were, (1) I would not hesitate, (2) I would go into debt, (3) I would pay if I have enough money and (4) I would not pay. These options were designed to encourage the respondents' intentions rather than beliefs or attitudes. Intentions are better predictors of behaviour than attitudes [18]. To explain what determines the WTP for improved quality of health services, we constructed a regression model in which the dependent variable is based on the four answers as follows. For each aspect of quality considered, and for the binary nature of the dependent variable we merged the first three answers (1)–(3). We interpreted these as signifying that the respondent is willing to pay for this aspect of quality and the dependent variable takes a value = 1. If, instead, the respondent answers (4), then we interpreted this as signifying that he/she is not willing to pay the proposed amount and the dependent variable takes the value = 0 (Fig. 1 shows the construction of the dependent variables for the two groups).



a: Group (1) is already paying for the public health services.  
b: Group (2) receives free of charge public health services.

Fig. 1. The dependent variables construction.

### 3.3. Steps in regression analysis

#### 3.3.1. Models selection

The data used in this paper were taken from a multi-purpose household survey. To avoid irrelevant variables bias, some variables were eliminated as a first step in the model-building strategy. Due to transportation and security constraints the survey was conducted during daylight and thus most of the respondents were females (62.9%). To solve the problem of the ratio of cases to variables a process of merging categories was done for the variables age, family size, education, occupation and the type of the disease [22].

A necessary step in the model building strategy is the selection of variables to fit the model. A univariable selection analysis of each variable, i.e. Chi square, *t*-test, correlation and the ordinary least square (OLS), was done. Appendix C and Appendix D present the results of the OLS models for group 1 and group 2, respectively, as the last step of the

univariable selection analysis. After completion of the univariable analysis, a selection for the multivariable analysis was carried out. Any variable with a level of statistical significance  $<.05$  was a candidate for the multivariable model and for variables considered important for the paper. Following the fit of the multivariable model, the importance of each variable included in the model was verified by a Wald statistics examination [23].

Models with only the significant variables of the OLS estimations proved to be poor models for the two groups. The direct and the stepwise procedures were used instead. Compared to the OLS results, the full models of the direct procedure method for both groups show that some variables were eliminated and that the models do not fit better than the OLS models. In the stepwise procedure method a backward logistic regression was done and a series of additions and removals together with interactions and combination of variables resulted in eight models that have the advantage over the OLS and the full models.

### **3.3.2. Statistical method**

Because of the dichotomous nature of the dependent variables a LRM was used for the statistical analysis to estimate the factors (independent variables) that influence the dependent variable willingness to pay. Appendix E presents the statistical analysis method.

## **4. Results**

### **4.1. Descriptive results of the survey**

The description of the socio-demographic variables in the sample can be found in Table 3. The frequencies in Table 3 show that more than 80% of the respondents in group 1 are willing to pay extra money for public health services if these services are of good quality. In group 2, more than 75% is willing to pay for public health services if these services are of good quality. Table 3 also shows that almost 80% of the respondents are in highly productive middle age (31–40 years). It also shows the family size scales i.e. that

Sudanese society is composed of extended families. This explains the high dependency rate (93.5%) [24]. Primary education in Table 3 refers to illiterate, pre-school Khalwa (Quraanic School), and primary school education. Secondary education refers to secondary and higher secondary schools. University education refers to graduates and post-graduates. The relatively high percentage of university education is only found in Khartoum and big cities, as is clear if we consider that in the whole of Sudan the literacy rate is 40% for males and 15% for females [25].

**Table 3: Description of the dependent and the socio-demographic independent variables in the sample**

The dependent and the socio-demographic variables	Value range	Frequencies	N	Min	Max	Mean	S.D.
<b>Group 1 dependent variables</b>							
Seen by a specialist	1 = yes	86.9	388	0	1	.87	.338
	0 = no	13.1					
Lab and X-ray analysis	1 = yes	85.8	388	0	1	.86	.349
	0 = no	14.2					
Drugs availability	1 = yes	88.1	387	0	1	.88	.324
	0 = no	11.9					
Reduce waiting time	1 = yes	81.7	388	0	1	.82	.387
	0 = no	18.3					
<b>Group 2 dependent variables</b>							
Seen by a specialist	1 = yes	75.8	62	0	1	.76	.432
	0 = no	24.2					
Lab and X-ray analysis	1 = yes	77.0	61	0	1	.77	.424
	0 = no	23.0					
Drugs availability	1 = yes	80.6	62	0	1	.81	.398
	0 = no	19.4					
Reduce waiting time	1 = yes	75.8	62	0	1	.76	.432
	0 = no	24.2					

<b>The dependent and the socio-demographic variables</b>	<b>Value range</b>	<b>Frequencies</b>	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>S.D.</b>
Age	1 = 31 – 40 years	79.1	450	1	2	1.21	.407
	2 = 41 – 50 years	20.9					
Family size	1 = 1–6	50.0	450	1	3	1.59	.652
	2 = 7–10	40.9					
	3 = 11–15	9.1					
HH education	1 = primary	27.1	450	1	3	2.03	.757
	2 = secondary	42.7					
	3 = university	30.2					
HH occupation	1 = employee	30.2	450	1	7	3.49	2.217
	2 = labour	16.3					
	3 = merchant	34.4					
	4 = jobless	3.3					
	5 = military and police	15.8					
Monthly Income HH			409	1	5	2.86	1.307
1 = <100000	1 = very low income	19.3					
2 = 100000–150000	2 = low income	21.5					
3 = 150000–300000	3 = moderate income	27.4					
4 = 300000–500000	4 = high income	17.8					
5 = >500000	5 = very high income	14.0					
Other income source	1 = yes	37.8	450	1	2	1.62	.485
	2 = no	62.2					
Have a car	1 = yes	28.0	450	1	2	1.72	.449
	2 = no	72.0					

<b>The dependent and the socio-demographic variables</b>	<b>Value range</b>	<b>Frequencies</b>	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>S.D.</b>
Dependents	1 = yes always	41.6	450	1	3	2.03	.928
	2 = yes sometimes	14.0					
	3 = none	44.4					
House ownership	1 = owned	70.4	450	1	3	1.43	.723
	2 = others	13.8					
	3 = rent	15.8					
HH pay school fees and pay for others	1 = yes always	70.6	436	1	4	1.58	.917
	2 = yes sometimes	8.3					
	3 = not pay	21.1					
Episodes of sickness during the last 3 months	1 = once	21.2	304	1	3	2.27	.824
	2 = twice	22.0					
	3 = >2	44.9					
	4 = none	11.9					
Disease type	1 = surgery and ortho.	7.2	307	1	4	2.66	1.033
	2 = obs. and paediatrics	8.1					
	3 = medicine	49.8					
	4 = others	34.9					
Visit frequencies to HSU during the last 3 months	1 = once	25.1	362	1	4	2.44	1.012
	2 = twice	18.8					
	3 = >2	42.5					
	4 = none	13.5					
Pay for treatment during the last 3 months	1 = yes always	66.2	450	1	3	1.48	.725
	2 = yes sometimes	20.0					

The dependent and the socio-demographic variables	Value range	Frequencies	N	Min	Max	Mean	S.D.
	3 = not paid	13.8					
Bought drugs during the last 3 months	1 = yes always	69.8	450	1	3	1.40	.664
	2 = yes sometimes	20.2					
	3 = not paid	10.0					

Migration to the business sector due to the economic liberalization policies explains the high percentage of the merchant category (34.4%).<sup>5</sup> In Table 3, 86% of the respondents have a monthly income between 100,000 and 500,000 Ls. These wages cover a small proportion of family expenses and are equal to one quarter of the family's expenditure [26]. Monthly income is an inadequate indicator for socio-economic status in developing countries. The variables referring to other income and to car ownership are also indications of the socio-economic status of the family. The variable referring to other income in particular is an example of how families bridge the income-expenditure gap. Questions on car and house ownership were asked to differentiate between different classes of socio-economic status, assuming that people who have a car and own a house are rich. The high percentage (70.4%) of house ownership indicates that the majority of the respondents have their own house. The variables 'have dependents' (55.6%) and 'pay tuition fees' (78.9%) together with the variable 'family size' show the burden of additional expenditure on the household's budget.

The high percentage of people who had paid for treatment during the last 3 months (86.2%) and who had bought drugs during the last 3 months (90%) show the considerable demand for and utilization of health care services. The response to questions on the number of episodes of sickness during the last 3 months (88.1%), frequency of visits to health service units for treatment during the last 3 months (86.4%), and the internal medicine diseases (49.8%) confirm this.

#### 4.2. Logistic regression estimation

The goodness of fit assessment for the eight models is presented in Appendix E. The models provide a good fit for the data; the percentage of correct predictions is between 78% and 88%, the chi squares are significant and the McFadden  $R^2$  are satisfactory.

Table 4 shows the LRM results for the dependent variables in group 1. For the first dependent variable for group 1, ‘specialist services’, the variables ‘moderate income’, ‘high income’, ‘very high income’, ‘always paid for treatment during the last 3 months’ and ‘sometimes paid for treatment during the last 3 months’ are statistically significant. While the variables ‘occupation’ and ‘bought drugs during the last 3 months’ are not significant, they are still important for the significance of other variables in the model. These results show that the odds ratio for the significant factors are more than one and this indicates that the respondents with these significant characteristics are more likely to be willing to pay for the public health services if these services were introduced by a specialist.

**Table 4: Logistic regression results for group 1 dependent variables**

Group 1 dependent variables	Independent variables	<i>B</i>	S.E.	Significance	exp( <i>B</i> )
Specialist services	Employee	−.078	.528	.882	.925
	Labour	−.034	.559	.952	.967
	Merchant	.633	.576	.271	1.884
	Jobless	−1.571	.931	.091	.208
	Low income HH (100000–150000)	.751	.487	.123	2.120
	Moderate income HH (150000–300000)	.945	.461	.041	2.572
	High income HH (300000–500000)	2.040	.696	.003	7.690
	Very high income HH (>500000)	1.592	.654	.015	4.913
	Always paid for treatment during the last 3 months	1.128	.566	.046	3.089
	Sometimes paid for treatment during the last 3 months	1.882	.759	.013	6.569



<b>Group 1 dependent variables</b>	<b>Independent variables</b>	<b>B</b>	<b>S.E.</b>	<b>Significance</b>	<b>exp(B)</b>
	Always bought drugs during the last 3 months	.123	.644	.848	1.131
	Sometimes bought drugs during the last 3 months	1.305	.748	.081	3.687
	Constant	-.321	.700	.647	.726
Lab and X-ray analysis	Employee	.014	.535	.980	1.014
	Labour	.190	.576	.741	1.209
	Merchant	.430	.572	.452	1.538
	Jobless	-1.445	.964	.134	.236
	Low income HH (100000–150000)	1.408	.509	.006	4.086
	Moderate income HH (150000–300000)	1.367	.470	.004	3.924
	High income HH (300000–500000)	2.311	.652	.000	10.081
	Very high income HH (>500000)	2.076	.664	.002	7.970
	Always paid for treatment during the last 3 months	1.680	.565	.003	5.364
	Sometimes paid for treatment during the last 3 months	1.764	.678	.009	5.836
	Always bought drugs during the last 3 months	-.176	.635	.782	.839
	Sometimes bought drugs during the last 3 months	1.454	.730	.046	4.280
	Own a house	1.345	.472	.004	3.838
	Others	1.145	.631	.070	3.143
	Constant	-2.084	.806	.010	.124
Drugs availability	Low income HH (100000–150000)	.780	.515	.130	2.182
	Moderate income HH (150000–300000)	1.144	.516	.027	3.139
	High income HH (300000–500000)	1.188	.578	.040	3.281
	Very high income HH (>500000)	1.218	.610	.046	3.379
	Always paid for treatment during the last 3 months	1.285	.550	.020	3.613
	Sometimes paid for treatment during the	.221	.591	.708	1.248

<b>Group 1 dependent variables</b>	<b>Independent variables</b>	<b>B</b>	<b>S.E.</b>	<b>Significance</b>	<b>exp(B)</b>
	last 3 months				
	Always bought drugs during the last 3 months	.600	.578	.299	1.822
	Sometimes bought drugs during the last 3 months	1.969	.698	.005	7.165
	Own a house	.966	.490	.048	2.628
	Others	.686	.631	.277	1.986
	Constant	-1.175	.648	.070	.309
Decrease waiting time	Employee	.972	.531	.067	2.643
	Labour	.751	.553	.174	2.120
	Merchant	1.434	.545	.009	4.195
	Jobless	-.288	.933	.758	.750
	Low income HH (100000-150000)	.537	.502	.284	1.712
	Moderate income HH (150000-300000)	.791	.479	.098	2.206
	High income HH (300000-500000)	-.022	.522	.966	.978
	Very high income HH (>500000)	2.396	1.098	.029	10.980
	Always paid for treatment during the last 3 months	1.194	.543	.028	3.302
	Sometimes paid for treatment during the last 3 months	1.261	.659	.056	3.528
	One visit to HSU unit during the last 3 months	-.723	.581	.213	.486
	Two visits to HSU unit during the last 3 months	-.245	.634	.699	.782
	More than two visits to HSU unit during the last 3 months	-.054	.578	.925	.947
	Constant	-.555	.801	.488	.574

For the second dependent variable for group 1, 'advanced lab and X-ray analysis', the variables 'low income', 'moderate income', 'high income', 'very high income', 'always

paid for treatment during the last 3 months', 'sometimes paid for treatment during the last 3 months', 'sometimes bought drugs during the last 3 months' and 'own a house' are statistically significant. While the variable 'occupation' is not significant, it is still important for the significance of other variables in the model. These results show that the odds ratios for the significant factors mentioned above are 4, 4, 10, 8, 5, 6, 4, and 4, respectively (see column six in Table 3). This suggests that the respondents with these significant factors are more likely to be willing to pay for public health services assuming that the attribute of good quality in these services is an advanced lab and X-ray analysis.

For the third dependent variable for group 1, 'availability of drugs especially for children', only five factors significantly influence the probability of the household to be willing to pay for public health services. These factors are: 'moderate income', 'high income', 'very high income', 'always paid for treatment during the last 3 months', 'sometimes bought drugs during the last 3 months' and 'own a house'. These results show that the odds ratios for the significant factors are 3, 3, 3, 4, 7 and 3, respectively (see column six in Table 3). This suggests that those with such significant variables are more likely to be willing to pay for public health services if drugs are available, especially for children.

For the fourth dependent variable for group 1, 'decreased waiting time', the variables 'merchant', 'high income', and 'always paid for treatment during the last 3 months' are statistically significant. While the variables 'frequency of visits to health services unit during the last 3 months' is not significant, it is still important for the significance of other variables in the model. These results show that the odds ratio for the HH who is a merchant is almost 4.195. This suggests that those who are merchants are over four times more likely to be willing to pay for public health services if the waiting time for these services decreases. The odds ratio for the HH who has a high income is almost 10.980. This suggests that those who have a high income are almost eleven times more likely to be willing to pay for public health services if the waiting time for these services decreases. The odds ratio for the HH who always paid for treatment during the last 3 months is almost 3.302. This suggests that those who always paid for treatment during the last 3 months are almost three times more likely to be willing to pay for public health services if the waiting time for these services decreases.

Table 5 shows the LRM results of the dependent variables for group 2. The first dependent variable for group 2, ‘specialist services’, has only two factors that significantly influence the probability of the household WTP: ‘family size (1–6)’ and ‘HH education (university)’. While the variable ‘have dependents’ is not significant it is still important for the significance of other variables in the model. These results show that the odds ratios of the significant factors are 6.963 and 7.099, respectively. This suggests that the respondents of the significant factors mentioned would be more likely to be willing to pay for public health services if these services were introduced by a specialist.

**Table 5: Logistic regression results for group 2 dependent variables**

Group 2 dependent variables	Independent variables	<i>B</i>	S.E.	Significance	exp( <i>B</i> )
Specialist services	Family size (1–6)	1.941	.942	.039	6.963
	Family size (7–10)	1.778	.955	.063	5.920
	HH education (secondary)	1.087	.804	.177	2.964
	HH education (university)	1.960	.960	.041	7.099
	Always have dependents	–.549	.994	.581	.578
	Sometimes have dependents	–1.064	1.075	.322	.345
	Constant	–.654	1.148	.569	.520
Lab and X-ray analysis	Family size (1–6)	1.831	.945	.053	6.241
	Family size (7–10)	2.143	1.007	.033	8.526
	HH education (secondary)	1.250	.902	.166	3.491
	HH education (university)	1.263	.891	.156	3.537
	Always have dependents	–1.503	1.247	.228	.222
	Sometimes have dependents	–1.326	1.363	.331	.265
	Constant	.131	1.315	.921	1.140

Group 2 dependent variables	Independent variables	<i>B</i>	S.E.	Significance	exp( <i>B</i> )
Drugs availability	Family size (1–6)	1.806	.999	.071	6.087
	Family size (7–10)	1.185	.973	.223	3.271
	HH education (secondary)	1.833	.912	.045	6.250
	HH education (university)	2.499	1.157	.031	12.170
	Constant	–.901	.789	.254	.406
	Decrease waiting time	Family size (1–6)	2.596	1.207	.031
Family size (7–10)		2.362	1.203	.049	10.616
HH education (secondary)		.523	1.022	.609	1.688
HH education (university)		1.799	1.213	.138	6.044
One attack of sickness during the last 3 months		–.328	1.526	.830	.720
Two attacks of sickness during the last 3 months		–2.546	1.038	.014	.078
Constant		–.395	1.004	.694	.674

For the second dependent variable for group 2, ‘advanced lab and X-ray analysis’, only the variable ‘family size (7–10)’ is statistically significant. While the variables ‘HH education’ and ‘have dependents’ are not significant they are still important for the significance of other variables in the model. These results show that the odds ratio for the HH who have a family size of (7–10) members is almost 8.526. This suggests that those with a family size of 7–10 members are almost nine times more likely to be willing to pay for public health services if these services include advanced lab and X-ray analysis.

In the regression with ‘availability of drugs especially for children’ as the dependent variable, the variables ‘HH education (secondary)’ and ‘HH education (university)’ are statistically significant. While the variable ‘HH family size’ is not significant, it is still important for the significance of other variables in the model. These results show that among group 2 the odds ratios of the significant factors are 6.250 and 12.170, respectively. This suggests that the respondents with such factors are more likely to be willing to pay for public health services if drugs are available, especially for children.

In the fourth equation for group 2, ‘decreased waiting time’, only the variables ‘family size (1–6)’, ‘family size (7–10)’ and ‘episodes of sickness during the last 3 months’ are statistically significant. While the variable ‘HH education’ is not significant, it is still important for the significance of the model. The positive odds ratios of the ‘family size’ (1–6) and ‘family size’ (7–10) indicate that respondents with these significant variables are more likely to be willing to pay for public health services if the waiting time for these services decreases. The negative odds ratio for the variable ‘episodes of sickness during the last 3 months’ indicates that the respondent with this variable is less likely to be willing to pay for public health services if the waiting time for these services decreases.

## 5. Discussion

The overall percentages of people willing to pay for good quality of public health services in group 1 and group 2 are more than 80% and 75%, respectively. This indicates a high percentage of WTP for public health services with good quality and supports the claims of health planners. These empirical findings confirm the importance of the quality of health services in motivating the demand for public health services. It appears that with improved services, a floor for reasonable fees could be set [14]. This supports the continuity of the cost recovery policies because virtually the majority of the households are willing to pay these reasonable fees.

Our results show that the willingness to pay for each aspect of the quality of public health services (dependent variables) depends on the respondents’ characteristics. Table 6 provides these main influencing characteristics for quality aspects for the two groups of respondents.

**Table 6: The main characteristics influencing quality aspects for groups 1 and 2**

WTP for	Main determinants
Group 1	
Specialist services	Monthly income (either moderate, high or very high)
	Use of health services (who always or sometimes paid for treatment during the last 3 months)

<b>WTP for</b>	<b>Main determinants</b>
Advanced lab and X-ray analysis	Monthly income (either low, moderate, high or very high)
	Respondent's wealth (house ownership)
	Use of health services (always or sometimes paid for treatment during the last 3 months)
	Drugs consumption (sometimes bought drugs during the last 3 months)
Availability of drugs specially for children	Monthly income (either moderate, high or very high)
	Respondent's wealth (house ownership)
	Use of health services (always paid for treatment during the last 3 months)
	Drugs consumption (sometimes bought drugs during the last 3 months)
Decreased waiting time	Occupation (merchant)
	Monthly income (very high)
	Use of health services (always paid for treatment during the last 3 months)
<b>Group 2</b>	
Specialist services	Family size (1–6 members)
	Education (university education)
Advanced lab and X-ray analysis	Family size (7–10 members)
Availability of drugs specially for children	Education (either secondary or university education)
Decreased waiting time	Family size (either 1–6 or 7–10 members)
	Episodes of sickness (two attacks of sickness during the last 3 months)

For group 1, socio-economic factors are important determinants of WTP. The LRM analysis shows that the main socio-economic variables ('income', 'merchant', 'house ownership') and expenditure on health (i.e. 'always and sometimes paid for treatment during the last 3 months' and 'always and sometimes bought drugs during the last 3 months') have a significant impact on WTP behaviour. The higher a respondent's income, the greater his/her willingness to pay, and the more eager he/she is to pay for good quality public health services.

'House ownership' and 'merchant' variables are powerful indicators for the relatively high socio-economic status of a respondent in developing countries like Sudan. Although monthly income is an imperfect indicator of socio-economic status in developing countries, it can still be accepted in the presence of powerful indicators like 'merchant'.

Generally there are no prominent differences between the four aspects of quality of health with regard to the influence of socio-demographic characteristics of group 1. Nevertheless the preference for high quality of 'lab and X-ray unit analysis' and 'availability of drugs especially for children' is expressed by respondents who have a high demand for health care and who own a house i.e. most probably older residents. This is a notable point that should help planners and designers of community participation programmes to consider the requirements of older residents, their families and their community leaders when arranging the quality they prefer. It also emphasizes that these two quality aspects of services should be considered when setting charges. Besides this, the significant effect of a low income on the demand for lab and X-ray analysis is surprising and should be considered in planning. Decreased waiting time as an aspect of quality of health care seems to be favoured by the rich population. Unless the government directs revenues to be used in the same facility it will never be able to achieve a decrease in waiting time. This is because incentives will encourage the facility to make personnel available. Not only that, the facility could then overcome the chronic problem of electricity shortages that paralyse the lab and the X-ray investigation and make the waiting time even longer. If revenues are retained within the facility, managers will be able to avoid the chronic shortages of consumables by using the private market to fill the supply gap with e.g. lab reagents, X-ray films, catheters and disposable syringes.

The high percentage of people favouring 'availability of drugs' compared to the other three aspects of quality of health services confirm that people consider the availability of drugs as the most important aspect on which to judge the quality of health services [14], [15] and [16]. The appreciation for public health services that adopt cost recovery policies seems to increase if quality, as measured by the availability of drugs, also increases [27]. This may be because drugs are better defined than the other quality improvements [19]. The existence of infectious diseases in developing countries has made the role of drugs in relieving the situation obvious. The establishment of an active



market of pharmaceuticals in Sudan means that information is now available on drug prices and on how much of the household budget is actually spent on drugs [19].

For group 2 the variables 'family size' and 'high education' have a significant impact on respondents' WTP behaviour. Respondents from bigger families tend to be more willing to pay for good quality public health services. This may be due to the nature of infections and the anticipation by big families that they will have to spend a lot of money if they delay appropriate and quick treatment.

The results show that a more highly educated respondent is more WTP for good quality public health services [28]. The reason for this may be related to the close relationship between high levels of income and education. Higher education also implies that people have more information and are more able to evaluate and judge [12].

Both groups are willing to pay for good quality public health services. However, some differences between them appear when we look at the respondents' characteristics that influence their WTP. If we compare the two groups on their WTP for good quality public health services, we see that group 1 respondents who are used to paying for health services are more willing to pay than group 2 respondents who would be willing to pay for the first time. The high WTP by group 1 in comparison to group 2 can be seen as an indication of the satisfaction of group 1 respondents with the existing public health services. Further it indicates their belief in the assumption that if they pay an extra amount of money it will encourage improvement in the quality of the health services. Furthermore this reflects the trust and the belief of group 1 respondents in cost recovery policies. The lower WTP of group 2 may be due to hesitation and uncertainty about these new experiences. It may also be due to the amount of money that is mentioned in the contingent valuation scenario (Appendix A). However the long history of receiving free of charge public health services is expected to be a psychological barrier and may prevent them from accepting the idea of paying for health services. The results of the LRM are consistent with the expectations for both groups. While group 1 respondents varied in their WTP due to economic factors, the group 2 respondents varied in their WTP through (high) education and (big) family size.

One of the unexpected results is the insignificant effect in the LRM of being employed. At the time of the research the adoption of the health insurance scheme had not been

completed. During the pre-test phase we recognized a bias related to the answers of the insured-employee H.H. Although they are insured employees they were not willing to admit this when answering the questionnaire. Because of this bias we have excluded any reference to the respondent being insured.

## **6. Policy suggestions and conclusions**

The majority (i.e. more than 75%) of the respondents are willing to pay for public health services. These results have been obtained on the assumption that public health services are of good quality. It appears that with improved services, some reasonable floor fees could be set. This supports and encourages the continuity of cost recovery policies because the majority of the households are willing to pay a reasonable fee. Our conclusions and the policy suggestions' validity is confirmed by the situational analysis of Sudan presented in The National Strategic Plan of Sudan—The First Quarter of the Century (2003–2027) [29].

Charges would be appropriate if the money collected is used to improve the quality of services. Thus special attention should be paid to the policies of circulating fee revenues within the facility and of using them to improve the quality of services [30]. Policymakers in Sudan should focus on those quality improvements that might ultimately reduce the financial burden on the poor. This may include improving the quality of the lab, X-ray analysis and availability of drugs [18].

The continuity of cost recovery policies will prepare the ground for the establishment of community-based health insurance and will help the government to contribute to the effectiveness and sustainability of the informal sector [31]. No doubt many more studies are needed to explore other areas important for this establishment.

Regarding the private sector these results are encouraging for the tremendous growth of this sector for two reasons. First, the high percentage of WTP for the quality of health services favours the private sector. Second, the stabilization of the health financing policy will encourage the private sector to continue growing. The coordination with the public sector should be consistent with these attempts. These results also prepare the ground for

co-operation between the public and the private sectors and invite the launch of private–public initiatives.

More studies on WTP approaches are needed to complete the scene and to deal with the uncovered areas. For example a survey to detect the individual WTP together with the household's WTP will allow for more generalization of the findings [17]. Moreover, some researchers have criticized the World Bank generalization of WTP results as ability to pay and argued that ‘it tells little about ability’. So, we have to consider WTP results as heralds and potentials for ability to pay, to be confirmed by additional studies [10].

The fact that there is no golden rule in contingent valuation means that other contingent valuation methods are important to support the findings of the take-it-or-leave-it procedure and to overcome its biases. The combination of more than one contingent valuation method in one study will encourage the findings and provide more reliable results.

Finally, these results are expected to encourage the government to be more cautious about decisions in health financing. No doubt the government should pay more attention to such studies.

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