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ESTIMATING THE WILLINGNESS TO PAY FOR QUALITY OF CARE: COMPARISON OF CONTINGENT VALUATION AND TWO-STEP HEALTH EXPENDITURE METHODS

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By

Marcia Weaver, PhD
Consultant

Ruth Kornfield, PhD
Rainbow Consulting

Michael Chapko, PhD
University of Washington

Cesaire Blewane, TSSP
Ministry of Public Health and Social Affairs

Robert Ndamobissi
Min. of Economics, Plan, Statistics and International Cooperation

Antoine Sathe, TSSP
Ministry of Public Health and Social Affairs

Leon-Patrice Ngueretia
Consultant

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Health Financing and Sustainability (HFS) Project
Abt Associates Inc., Prime Contractor
4800 Montgomery Lane, Suite 600
Bethesda, MD 20814 USA
Tel: (301) 913-0500 Fax: (301) 652-3916
Telex: 312636

The Urban Institute, Subcontractor
Management Sciences for Health, Subcontractor
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ABSTRACT

With increased interest in establishing user fees as a source of revenue for public health facilities in developing countries comes the necessity for improvement in the quality of health care services. This study provides an analysis of how facility utilization can be affected by increased fees and improved care.

Two methods were employed to estimate the willingness to pay for improved quality of care: contingent valuation and a two-step health care expenditure model. This report documents median willingness to pay for seven quality improvements: 1) facility maintenance; 2) personnel supervision; and pharmaceuticals to treat: 3) malaria, 4) sexually transmitted diseases, 5) acute respiratory infections, 6) intestinal parasites, and 7) diarrheal diseases.

The results, using the two methods, demonstrated that willingness to pay would exceed the estimated cost for each quality improvement.

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FOREWORD

The Health Financing and Sustainability (HFS) Project provides technical assistance and conducts applied research, training, and information dissemination to developing countries in health economics, health sector policy development, and health services management. The Applied Research (AR) component of the project provides opportunities to increase knowledge of the complex issues underlying health financing problems, and augments the supply of qualified individuals who can contribute to policy analysis and reform. HFS is emphasizing the following policy areas for applied research activities: cost recovery, productive efficiency, social financing, and private sector development in the health sector.

As part of the project's AR component, HFS will complete up to 30 small applied research (SAR) activities over the life of the project, from 1989 through 1994. These include studies undertaken by developing country researchers, HFS researchers, or academics at universities in the United States. The objectives of the SAR program are to carry out practically-oriented research in developing countries, and encourage the development of local capacities to undertake research.

Most SAR activities are initiated through proposals to the HFS project. The proposals are evaluated by HFS staff, including criteria such as: practical policy orientation, resource and time requirements, and appropriateness to the HFS research agenda. Most proposals for SAR activities accepted by HFS undergo several revisions, as the researchers refine their research objectives, hypotheses, and methodologies, based on suggestions and comments from the HFS staff. Once approved, SAR activities are overseen by HFS task managers, who work closely with principal investigators to monitor the timeliness and quality of the work, and facilitate logistics.

Other SAR studies are done in conjunction with technical assistance or major applied research activities of the HFS project. In these cases, the SAR contributes to technical guidance provided to clients, or adds to the body of knowledge on topics of health financing and economics.

As with all HFS research, drafts of SAR reports are reviewed by HFS staff, then evaluated by external technical reviewers selected on the basis of area of substantive and/or geographic expertise. However, the final version of this paper only incorporates some of the numerous comments and suggestions provided by HFS to the authors.

Holly Wong
Applied Research Coordinator

EXECUTIVE SUMMARY

During the last decade, user fees have been the focus of most efforts to increase financial resources for public facilities in developing countries. In most cases, however, improvements in the quality of health care services must also be instituted if a user fee system is to be successful. A critical issue for policymakers is how a combination of user fees and quality improvements will affect utilization at public facilities. This study addressed this issue through the application of two methodologies — contingent valuation and the two-step health care expenditure model — to estimate the willingness to pay for seven quality improvements at the primary care level.

Contingent valuation questions were used to collect information on demand for a higher level of service quality. Interviewers described a hypothetical quality improvement to respondents and then asked if they would pay a specific price for it. Respondents were asked about seven quality improvements; variation in the prices (there were five versions with different price lists for the quality improvements) made it possible to estimate a demand curve rather than a single point. The household survey collected information on utilization and expenditures for health care during the prior month to estimate the demand for care at the current level of quality of care. To estimate the shift in the curve caused by an increase in the quality of care, data were collected on the current quality of care at the health facilities.

This study also employed a second methodology to estimate willingness to pay, the two-step health care expenditure model. This latter model estimates 1) the probability that a person who was ill had expenditures for modern care, and 2) estimates of expenditures, using the subsample of patients with expenditures. Health care expenditures were the product of these two steps.

Using the contingent valuation methodology, the median willingness to pay estimates for each of the seven quality improvements ranged from 3730 CFCA for pharmaceuticals to treat diarrheal diseases to 1815 FCFA to improve the knowledge of health personnel. The median willingness to pay is at least 1700 FCFA more than the estimated cost for each of these quality improvements.

The two-step health expenditure model estimated the median total expenditure for modern care to be 1750 FCFA. The survey also documented the absence of pharmaceuticals in public facilities. These facilities had pharmaceuticals in stock to treat, on average, only 1.7 of the five illnesses referred to in the contingent valuation questions. As a result, the patients of public facilities had to purchase pharmaceuticals from private sources.

In light of this adjustment in the public health care market caused by the purchase of pharmaceutical from private sources, the two-part model was estimated for two types of expenditures: 1) total expenditures for modern care, and 2) expenditures at facilities, including transportation. In both estimates, none of the three quality of care variables was significantly related to the probability of expenditures.

Convergent validity is the extent to which two measures that seek to measure the same underlying construct are correlated. In the absence of a true

measure as a standard of comparison, a correlation between the two observed measures validates both measures. In this study, the contingent valuation and two-step expenditure measures of willingness to pay for pharmaceuticals corresponded closely to each other. The two measures of median willingness to pay for facility maintenance and knowledge of personnel, however, did not correspond well. The measures may have been more successful for willingness to pay for pharmaceutical for three reasons: 1) pharmaceuticals are more well-defined and concrete than the other quality improvements, 2) the Central African Republic (CAR) has an active market for pharmaceuticals that has educated the population about prices, and 3) the market for pharmaceuticals provides valid data on current expenditures for them. This willingness to pay measure, however, may be less successful in countries that have a less well-developed private pharmaceutical market.

Although both methods of measurement provided similar estimates of the willingness to pay for pharmaceuticals, further research is recommended to compare the results from the contingent valuation approach with other methods of estimating willingness to pay for improved health services. This research is among the first to analyze the relationship between user fees and the quality of health care and merits replication and refinement in other countries and for other quality improvements.

1.0 INTRODUCTION

During the last decade, user fees have been the focus of most efforts to increase financial resources for public facilities in developing countries. The most obvious objective for user fees was to raise revenue, and many of the proponents of user fees thought that the ultimate objective was to use the revenue to improve quality of health care. This relationship between user fees and quality of care has not always been clear in the literature on user fees, with the exception of the work of Mwabu and Mwangi [1], nor has it been clear in project design and implementation.

Because the demand for curative ambulatory care has been shown to be elastic, an increase in user fees in the absence of an improvement in quality will decrease utilization of health care. For example, Waddington and Enyimayew reported an 84 percent decrease in utilization of rural facilities and a 31 percent decrease for urban facilities following a large increase in user fees in the Ashanti-Akim district of Ghana. [2] Yoder reported a 32 percent decrease in the use of government facilities following an increase in user fees in Swaziland [3] and Frankish reported a decrease in outpatient visits following a increase in user fees at Bishop Lavis Day Hospital in Cape Town, South Africa. [4]

In contrast, when user fees are introduced in combination with an improvement of the quality of care, utilization of health care can increase. For example, the Ministry of Public Health of Niger reported that their user fee/quality improvement program at the public facility in Tiberi led to an 84 percent increase in utilization of that facility. [5] The Ministry of Public Health and Social Affairs of Mali reported that their user fee/quality improvement programs in the Timbuctu and Gao regions led to a 23 percent increase in utilization of public facilities in those regions. [6]

The practical issue for project design and implementation is whether or not a particular combination of user fees and quality improvements will increase utilization of public facilities. The research sought to address this issue by explicitly modelling and estimating the relationship between user fees and quality of care. Willingness to pay for quality improvements at public facilities in the CAR was estimated with two different methods: 1) contingent valuation methods, and 2) two-step health expenditure methods based on current health care expenditures.

The research is presented in six sections. Section 2 provides a graphical representation of the research issues related to willingness to pay for quality improvements and the two methods. Section 3 is a presentation of the two estimation techniques. Section 4 is a brief description of the sample and sample statistics. The results of the estimates are presented in Section 5. Section 6 is a comparison of the measures of willingness to pay for quality, and Section 7 is the conclusion.

2.0 RESEARCH ISSUES

2.1 GRAPHICAL PRESENTATION OF THE RESEARCH ISSUES

The relationship of user fees and quality of care was addressed in the context of the concept of willingness to pay. Formally, willingness to pay is the demand curve for health care that represents the negative relationship between price and quantity of care demanded, as shown with the curve D(P,L)[1] in Exhibit 1. For a given user fee, the demand curve shows the quantity of care demanded. Conversely, for a given quantity of care, the demand curve shows the upper bound for the user fee.

In the absence of user fees, public facilities are represented in Exhibit 1 by the price P_0 and quantity of care demanded is Q_0. A user fee of P_1 will cause the quantity of care demanded to decrease to Q_1. This is the negative relationship of price and quantity reflected in the work of Waddington and Enyimayew, Yoder, and Franklin.

The effect of a third variable such as the quality of care is represented on this two-dimensional graph by a shift in the demand curve. In Exhibit 2, an increase in the quality of care will cause the demand curve to shift to the right as shown with the curve D'(P,L'). In this graphical example, a user fee of P_1 introduced in combination with a quality improvement will cause the quantity of care demanded to increase to Q_1'. In this case, the negative effect of an increase in price was less than the positive effect of the increase in quality, so the net effect was an increase in the quantity of care demanded. This is the experience reported by the ministries of public health of Niger and Mali.

The practical issue for policymakers is what combination of prices and quality improvements will lead to an increase in utilization of public facilities.[2] This issue was addressed with the two methods described here.

2.2 CONTINGENT VALUATION METHOD

Contingent valuation questions were used to collect information on the demand curve for a higher level of quality of care, represented by D'(P,L') in Exhibit 2. The interviewer described a hypothetical quality improvement to the respondent, and then asked the respondent if he/she would pay a specific price for it. This type of contingent valuation question is called a "take-it-or-leave-it" or "referendum" question. [7]

Respondents were asked about seven quality improvements that may be included in the CAR's national user fee program. The quality improvements were: 1) facility maintenance, 2) supervision of personnel, and pharmaceuticals to treat 3) malaria, 4) sexually transmitted diseases (STDs), 5) acute respiratory

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[1] With D representing Demand, P representing Price, and L representing Quality.

[2] Accordingly, the underlying assumption is that there is currently under-utilization of curative services in government facilities.

Exhibit 1
Demand Curve Showing Negative Relationship of Price and Quantity

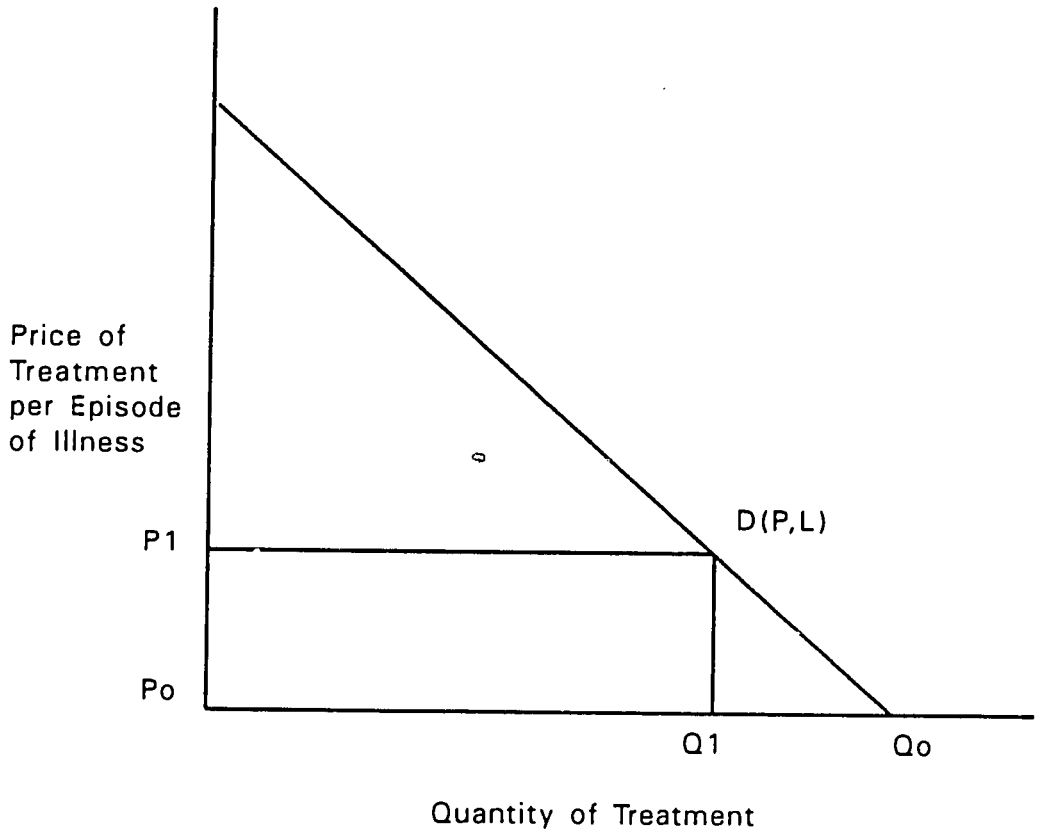
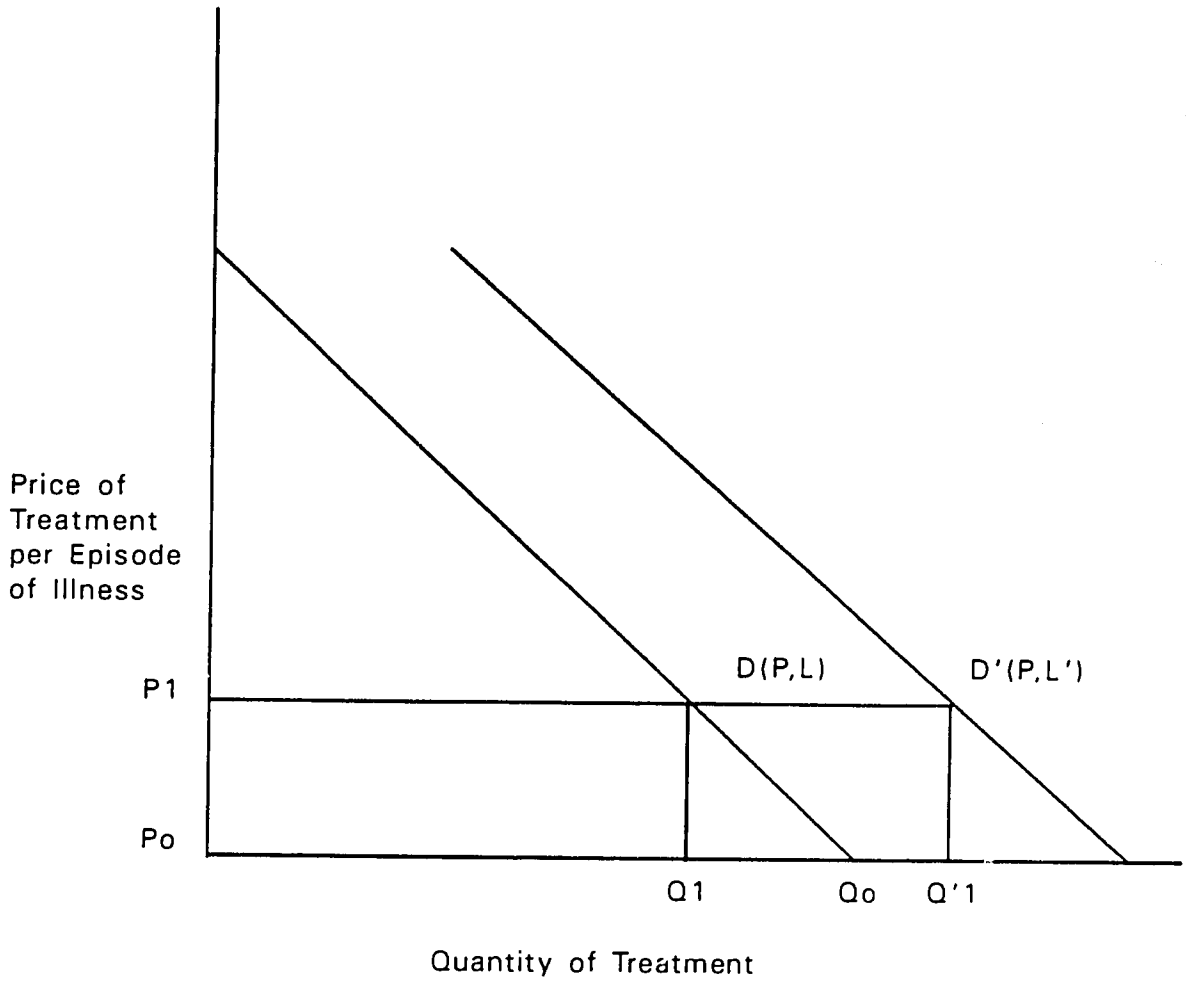


Exhibit 2
Shift in Demand Curve Following Improved Quality of Care



infections (ARIs), 6) intestinal parasites, and 7) diarrheal diseases. The questions for all seven of the quality improvements are reproduced in the Appendix.

Variation in the prices made it possible to estimate a demand curve rather than a single point. There were five versions of the questionnaire, and each version had a different set of prices. The prices in Version A, which were lowest, were based on the estimated cost of the quality improvements. [8] One of the five versions was randomly assigned to each respondent. The prices for the seven quality improvements for each version of the questionnaire are presented in Exhibit 10.

2.3 TWO-STEP HEALTH EXPENDITURE METHODS

Information on utilization and expenditures for health care during the month prior to the survey was collected to estimate the demand for care at the current level of quality of care, represented by D(P,L) in Exhibit 2. The interviewer asked about utilization of modern and traditional care for each member of the household who had been ill, and about the distance traveled, expenditures for transportation, and expenditures for health care at an exhaustive list of private and public facilities and licensed and unlicensed pharmacies.

To estimate the shift in the curve caused by an increase in the quality of care, data were collected on quality of care at the health facilities. The supervisor of the team of interviewers visited each of the health facilities in the census tracts in the national sample and most other facilities outside of the census tracts that a member of a household in the sample had visited. The supervisor collected and verified information on: 1) whether or not there was a physician on staff, 2) cleanliness of the facility's building, 3) cleanliness of the facility's yard, and 4) availability of the pharmaceuticals that were used to treat the illnesses referred to in the contingent valuation questions.

3.0 ESTIMATION TECHNIQUES

3.1 CONTINGENT VALUATION METHODS

As with other economic methods, the contingent valuation method's concept of willingness to pay is derived from a utility function. The literature on this method includes two techniques for estimating willingness to pay: one based on the indirect utility function [9] and one recently developed by Cameroon that is based on the willingness to pay function itself. [10] The technique selected is based on willingness to pay because it is simpler and the results are easier to interpret. The following is a brief review of that technique.

Let willingness to pay be a function of a vector of independent variables such as total household consumption, education, and health status. For individual i it is:

$$WTP_i = X_i'A + u_i \qquad (1)$$

where X_i is a vector of independent variables, A is a vector of unknown parameters, and u_i is a random term that has a logistic distribution with mean 0 and variance c.

WTP_i was not observed, but the responses to the contingent valuation questions revealed whether or not the price quoted in the question, t_i, was more or less than WTP_i. The responses can be represented by an indicator variable $I1_i$, where

$$I1_i = 1 \text{ if } WTP_i > t_i \qquad (2)$$
$$I1_i = 0 \text{ otherwise.}$$

and

$$\text{Prob } (I1_i = 1) = \text{Prob } (WTP_i > t_i) = \text{Prob } (u_i > t_i - X_i'A) \qquad (3)$$

$$\text{Prob } (I1_i = 1) = 1 - \text{Prob } (u_i/kl < - (t_i - X_i'A)/kl)$$

Cameroon showed that equation 3 can be used to derive a censored logit likelihood function and described a convenient method for obtaining estimates of -1/kl and A/kl with conventional packaged logit algorithms when t_i is among the independent variables. Estimates of -1/kl can then be used to identify A:

$$A = -(A/kl)/(-1/kl) \qquad (4)$$

When the logit is estimated with only the vector of t and a vector of ones, the estimate of A for the constant term is the median WTP. Cameroon also showed how to calculate the correct standard error for A. [11]

There is a limitation to this technique, but it was not necessarily a problem for our analysis. In this data, WTP appeared to be log-normally distributed, so the natural log of ti was used as a regressor. With these estimates, the mean and median of WTP diverged, and only the median WTP was

estimated accurately. This limitation was not a problem for our analysis, because WTP was compared to current health care expenditures which are also log-normally distributed and for which the median was the preferred descriptive statistic. In addition, the median was meaningful to policymakers as the amount that at least half of the population will pay, whereas the mean did not have a comparable policy application.

3.2 TWO-STEP HEALTH EXPENDITURE METHODS BASED ON CURRENT HEALTH CARE EXPENDITURES

The literature on two-step health expenditure methods includes several different models as well as different estimation techniques for each model. In general, research on the demand for health care in developing countries has been based on an indirect utility function model that focuses on provider choice [1, 12, 13]. In contrast, much research in developed countries has been based on models of the expenditures themselves. [14]

In previous research in developing countries, there was a close relationship between provider choice and health care expenditures that contributed to the focus on provider choice. Patients who visited public facilities paid low or no user fees and had low health care expenditures. Patients who visited private facilities paid higher user fees and had higher expenditures. Consequently, a choice between public and private providers was also a choice between low or high expenditures. Presumably, patients who did not visit a facility had no expenditures for modern care.

In the CAR research, both provider choice and expenditure models were estimated, but only the expenditure models were presented, because a close relationship was not found between provider choice and expenditures. Although most public facilities in CAR did not have user fees, 58 percent of the patients who visited public facilities had considerable expenditures for pharmaceuticals at licensed or unlicensed pharmacies. Seventy-two percent of the patients who did not visit either a public or private facility had similar expenditures for pharmaceuticals.

There are also several models for health care expenditures, including: 1) the two-part model and its extension, the four-part model, developed by Manning, et al. [14] and 2) the sample model. [15] The two-part model was used because of its simplicity and statistical properties. [16] The following is a brief review of that model and the techniques for estimating it.

In the two-part model, the relationship of health care expenditures to the quality of care was estimated in two independent steps: 1) estimates of the probability that a person who was ill had expenditures for modern care, and 2) estimates of expenditures using the subsample of patients with expenditures. Health care expenditures were the product of these two steps.

In the first step, whether an individual i has expenditures denoted MED_i is represented by an indicator variable $I2_i$, where:

$$I2_i = 1 \text{ if } MED_i > 0 \qquad (5)$$
$$I2_i = 0 \text{ otherwise.}$$

Let MED_i be a function of a vector of independent variables denoted Z_i such as total household consumption, education, health status, and quality of care, and let B1 be a vector of unknown parameters. Then the probability that a person who was ill had expenditures for modern care is stated:

$$\text{Prob } (I2_i = 1) = \text{Prob } (MED_i > 0) = \text{Prob } (e1_i > -Z_i'B1) \qquad (6)$$

where $e1_i$ is a random term with a mean of 0 and variance d1.

In the second step, the natural log of MED_i, denoted $\ln(MED_i)$ is a linear function of the Z_i. As noted, the distribution of health care expenditures is much more similar to a log-normal than a normal distribution. Formally,

$$\ln (MED_i \mid I2_i > 0) = Z_i'B2 + e2_i \qquad (7)$$

where $B2_i$ is a vector of unknown parameters and $e2_i$ is a random term with a mean 0 and variance d2.

Manning, et al. computed the likelihood function for steps 1 and 2 and showed that each step can be estimated separately. For the first step, it was assumed that $e1_i$ had a logistical distribution and the B1/k2 was estimated with a conventional logit algorithm. [17] In the second step, equation 7 for the subsample of individuals with expenditures was estimated with ordinary least squares.

There was a limitation of this model, but, again, it was not necessarily a problem for this research, in contrast to the research reported by Manning, et al., because there was not an independent variable for the price of health care, and the negative relationship of price and quantity of care as shown by the curve D(P,L) in Exhibit 2 was not quantified. This limitation did not detract from the ability to estimate how the curve D(P,L) shifted when the quality of care changes, if it was assumed that the price of every unit of health care from every provider was one monetary unit (dollar or franc), [18] and consequently that expenditures were a measure of the quantity of care. Technically, an increase in expenditures caused by a quality improvement was interpreted as a willingness to buy more units of health care, rather than a willingness to pay more for a single unit, but the policy implications of the increased expenditures would be the same.

The absence of the price variable limited the estimates of willingness to pay to a lower bound estimate. With reference to Exhibit 2, everyone who purchased Q_0 units of care was willing to pay at least P_0 for care. There were however, some people who were willing to pay more than P_0 whose willingness to pay is represented by points on the curve D(P,L) to the left of Q_0. The absence

of a price elasticity prevents knowing how much more than P_0 they would have been willing to spend.

3.3 COST ESTIMATES FOR EACH METHOD

Analyzing the costs for each method required allocating the costs of the national survey by type of question. There were five types of questions: 1) contingent valuation, 2) current health care expenditures, 3) description of household, 4) total household consumption, and 5) health status of the respondent. The allocation of costs by type of question was based on data from expense reports, purchase orders, consultant agreements, HFS long-term advisor semi-annual reports, and diaries.

There were three types of costs that corresponded to different methods of allocating costs by type of question: 1) design and training costs, 2) data coding, entry, and analysis costs, and 3) costs not allocated by type of question. Design and training costs were allocated based on Kornfield's (the HFS short-term technical advisor during the design and training activities) allocation of time for those activities. The percentage of time she allocated to each type of question was used to allocate all design and training costs, including per diems for supervisors and interviewers during the pre-test and training, and the cost of the HFS long-term advisor during those activities.

Data coding, entry, and analysis costs were allocated by two methods. The costs of data coding, entry, and cleaning were allocated based on the number of each type of question as a percentage of the total number of questions. These costs included salaries for the data coding and entry personnel, and cost of the data analyst and HFS long-term advisor during those activities. The costs of the rest of the data analysis were allocated based on purchase order amounts for each activity. When an activity covered more than one type of question, costs for that activity were allocated based on Weaver's diary. These costs included the data analyst and HFS long-term advisor during those activities.

Costs of preparing the survey proposal, field activities, and writing technical reports were fixed costs that were not allocated by type of question. An effort was made to allocate interviewing time by type of question, but interviewing was such a small amount of the time spent in the field that this effort had a negligible effect on the allocation of costs. Field costs were determined primarily by the sampling method; 86 percent of the time was spent on travel, meeting with local officials, and selecting households within each census tract (see Section 4.1). These costs would be the same for either the contingent valuation or the two-step health expenditure methods.

4.0 SAMPLE

4.1 NATIONALLY REPRESENTATIVE SAMPLE

This survey was conducted with a nationally representative sample of 1,263 households. Sixteen households were selected from each of 79 census tracts. [19,20] The census tracts were randomly selected during the design phase of the survey from a listing of the number of households per census tract by administrative unit (prefecture, subprefecture, and commune). There were separate listings for towns with more than 5,000 residents (including Bangui) and villages with less than 5,000 residents. The 16 households within each census tract were randomly selected by the supervisor of the team of interviewers during the field phase of the survey.

Census tracts were selected from three strata: 1) Bangui, (the capital city that was 10 times larger than the next largest town), 2) towns with more than 5,000 residents (excluding Bangui), and 3) villages with less than 5,000 residents. The stratified sample included more census tracts in urban areas (excluding Bangui) than in rural areas, because households in urban areas have higher health care expenditures that require larger samples for accurate estimates. The accuracy of the survey data was improved at no extra cost by selecting disproportionately more census tracts in urban areas and fewer in rural areas.

All of the results presented in this technical report have been weighted to account for the sample stratifications as well as for differences in the number of households across census tracts.

4.2 SAMPLE STATISTICS AND VARIABLE DEFINITIONS

Two datasets were constructed for two different types of observations from the national survey data: 1) households, and 2) individuals in the households who had been ill during the month prior to the interview.

The contingent valuation analyses were conducted with the household as the unit of analysis. Respondents in every household in the national sample answered the contingent valuation questions and provided the information necessary to analyze those data. Sample statistics for those households are presented in Exhibit 3.

Most of the variables in Exhibit 3 should not require explanation with the possible exception of total household consumption and cleanliness of the health facility. Household consumption included market goods and the products of agriculture, hunting, and fishing that were consumed. The interviewer asked the respondent about the amount and frequency of expenses during the month prior to the interview for 26 types of expenditures, including food, clothing, electricity, and family ceremonies. They also asked about market goods that were consumed but not purchased, such as the meat that a butcher brought home to his family. Then the interviewer asked about consumption of 11 common crops, 13 animals, and fish. The supervisors of the interviewers collected information on the prices of crops, animals and fish in each census tract in the national sample so an FCFA value could be calculated for the quantities consumed.

Exhibit 3: SAMPLE STATISTICS ON HOUSEHOLDS IN THE NATIONAL SAMPLE

VARIABLE	STATISTIC
Mean total household consumption	67,919 FCFA
Median total household consumption	47,612 FCFA
Mean years of education of respondent	3.3
Percentage of respondents who said that their health was:	
Good	20
Sometimes ill	62
Often ill	18
Poor	1
Percentage of residents of village with less than 5,000 inhabitants	47
Percentage of residents of towns with more than 5,000 inhabitants (excluding Bangui)	37
Percentage of residents of Bangui (451,690)	17
Percentage from Region I	35
Percentage from Region II	19
Percentage from Region III	20
Percentage from Region IV	14
Percentage of Region V	11
Mean distance to nearest public facility	11 km
Median distance to nearest public facility	5 km
Mean distance to nearest private facility	61 km
Median distance to nearest private facility	13 km
Percentage of households whose nearest public facility had physician on staff	42
Percent of households whose nearest private facility had physician on staff	31
Mean score for building cleanliness in nearest public facility (0 = worst, 4 = best)	1.1
Mean score for building cleanliness in nearest private facility (0 = best, 3 = worst)	0.9
Mean score for yard cleanliness in nearest public facility (0 = worst, 4 = best)	2.4
Mean score for year cleanliness in nearest private facility (0 = worst, 4 = best)	3.6
Mean number of pharmaceuticals in stock at nearest public facility that are used to treat illness referred to in the contingent valuation questions (0 = worst, 5 = best)	1.7
Mean number of pharmaceuticals in stock at the nearest public facility that are used to treat illnesses referred to in the contingent valuation questions (0 = worst, 5 = best)	4.2
Sample size	1,263

Cleanliness of the health facility was measured by the cleanliness of the building and yard. For the building score, a facility received one point for cleanliness of each of the following: 1) walls, 2) floors, and 3) instruments. For the yard score, a facility received one point for each of the following: 1) cut grass, 2) functioning latrine, 3) running water, and 4) trash can. A factor analysis showed that these two scores could be combined into one measure, which was the sum of each score weighted by its standard deviation.

Fifty-five percent of the households in the national survey had at least one member who had been ill during the previous month. Analyses of health care expenditures were conducted with the individual who had been ill as the unit of analysis. Information was collected about health care utilization and expenditures of each of those individuals. Sample statistics for the individuals who had been ill are presented in Exhibit 4. Household level variables such as total household consumption and health region were joined to the dataset of individuals, but statistics for these variables are not presented in Exhibit 4 because they are similar to those in Exhibit 3.

Exhibit 4: SAMPLE STATISTICS FOR INDIVIDUALS WHO WERE ILL DURING THE MONTH PRIOR TO THE INTERVIEW

VARIABLE	STATISTIC
Mean of expenditures for modern care	4,015 FCFA
Median of expenditures for modern care	1,750 FCFA
Mean of expenditures at a facility (including transportation)	3,034 FCFA
Median for expenditures at a facility (including transportation)	1,085 FCFA
Percentage of patients with expenditures for modern care	61
Percentage of patients with expenditures at a facility (including transportation)	32
Percentage of patients with a severe illness	49
Mean age of patient (in years)	25
Percentage of patients who are male	46
Education of the head of the household (in years)	4
Mean distance traveled for modern care	12 km
Median distance traveled for modern care	1 km
Percentage of patients who visited a facility with a physician on staff	42
Mean score for building cleanliness at facility visited by patients (0=best, 3=worst)	1.9
Mean score for year cleanliness at facilities visited by patients (0=worst, 4=best)	2.7
Mean number of pharmaceuticals in stock at facilities visited by patients that are used to treat illnesses referred to in the contingent valuation questions (0=worst, 5=best)	2.4
Sample Size	900

5.0 RESULTS

5.1 CONTINGENT VALUATION METHODS

5.1.1 Median Willingness to Pay for Each of Seven Quality Improvements

Exhibit 5 presents estimates of the medians of willingness to pay, as well as the estimated cost of each of the seven quality improvements. As shown, medians ranged from a high of 3730 FCFA[3] for pharmaceuticals to treat diarrheal diseases to a low of 1815 FCFA for improving the knowledge of personnel. The median willingness to pay is at least 1700 FCFA more than the estimated cost of every one of the quality improvements.

These estimates of willingness to pay should not be interpreted as our recommendations of the price to charge for the quality improvements. The fact that willingness to pay exceeds the cost of care means that the government would be providing a valuable service by introducing user fees at the estimated cost and improving the quality of care. For more information on the policy implications of this research, see Weaver, et al. [21]

5.1.2 Logistic Regression for Willingness to Pay for Quality Improvements

Logistic regressions were estimated to assess the validity and reliability of the responses to the contingent valuation questions. [7, pp. 189-209, 211-229] Validity in this context is the extent to which the responses to the questions measure willingness to pay. Reliability in this context is the extent to which the responses reflect true preferences rather than random responses. Two types of construct validity are examined: theoretical and convergent. Results of the assessment of theoretical validity are reported in this section and convergent validity assessment results are reported in Section 6.1.

Theoretical validity was assessed by examining whether the responses to the contingent valuation questions were related to the price of quality improvement and total consumption in ways that were consistent with economic theory. Specifically, economic theory predicts that respondents would be more likely to refuse to pay higher (rather than lower) prices for quality improvements. Economic theory also has a great deal to say about the relationship of willingness to pay to total consumption of goods and services, but the sign and magnitude of the relationship is ultimately an empirical question. In the case of health care, we can rely on a substantial empirical evidence that the demand for health care is positively related to total household consumption.

The results of the logistic regressions reported in Exhibit 6 show that the responses to the contingent valuation questions were consistent with economic theory and other empirical evidence. The coefficient for the natural log of the price was negative and significant for all seven quality improvements. Similarly, the coefficient for the natural log of total consumption was negative for all seven quality improvements. Further, we can readily calculate the income

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[3] $US 1 = 270 FCFA (1993).

Exhibit 5: ESTIMATED COST AND MEDIAN AMOUNT RESPONDENTS WERE WILLINGTO PAY FOR QUALITY OF CARE IMPROVEMENTS (IN FCFA)

QUALITY IMPROVEMENT	ESTIMATED COST	MEDIAN AMOUNT RESPONDENTS WERE WILLING TO PAY
Facility Maintenance	100 FCFA	2,540 FCFA
Knowledge of Personnel	100	1,815
Pharmaceuticals to Treat		
Malaria	150	1,850
STDs	500	2,950
Intestinal Parasites	300	3,520
ARIs	1,000	3,725
Diarrhea	150	3,730
Sample Size	1,263	

Exhibit 6: LOGISTIC REGRESSION FOR WILLINGNESS TO PAY FOR QUALITY IMPROVEMENTS

INDEPENDENT VARIABLE	FACILITY MAINTENANCE	KNOWLEDGE OF PERSONNEL	PHARMACEUTICALS TO TREAT				
			MALARIA	DIARRHEA	ARI	INTESTINAL PARASITES	STDs
Ln (Price of Improvement)	.132 (.053)	.493*** (.051)	-.421*** (.052)	-.555*** (.052)	-.446*** (.056)	-.588*** (.057)	-.621*** (.057)
Ln (Total Consumption)	.471*** (.075)	.483*** (.075)	.562*** (.076)	.516*** (.076)	.544 (.079)	.534 (.076)	-.532*** (.078)
Education of Respondents	.026 (.018)	-.000 (.017)	.011 (.018)	.008 (.018)	.049*** (.018)	.022 (.018)	.042 (.018)
Health Status of Respondents	.050 (.169)	-.319 (.165)	-.104 (.167)	-.476*** (.166)	-.380** (.175)	-.124 (.168)	-.343*** (.172)
Resident of Urban area	-.429** (.200)	-.726*** (.198)	-.428** (.201)	-.463** (.200)	-.621*** (.206)	-.186 (.201)	-.482*** (.204)
Resident of Bangui	-.805*** (.278)	-.710*** (.273)	-.585** (.277)	-.558** (.279)	-.634** (.282)	-.998*** (.280)	-.602 (.278)
Residence of Health Region							
Region II	.323 (.249)	-.222 (.237)	-.251 (.236)	-.644*** (.240)	-.121 (.235)	-.532** (.236)	.140 (.236)
Region III	-.010 (.212)	.356 (.210)	.098 (.209)	-.119 (.216)	.039 (.204)	-.110 (.207)	.569*** (.206)
Region IV	-.684*** (.231)	-.636*** (.239)	-1.003*** (.231)	-.951*** (.235)	-.828*** (.246)	-1.066*** (.231)	-.313 (.228)
Region V	-.796*** (.251)	-.650*** (.245)	-.722*** (.254)	-1.247*** (.256)	-.939*** (.267)	-1.118*** (.256)	-.773*** (.267)
Ln (Distance to Nearest Facility)	.132 (.072)	.047 (.071)	.087 (.071)	.078 (.070)	.049 (.071)	.195*** (.071)	.113 (.071)
Quality of Care at Nearest Facility							
Physician on Staff	.009 (.162)	.225 (.160)	.014 (.158)	.127 (.159)	.116 (.160)	-.130 (.157)	.110 (.159)
Cleanliness	-.096** (.046	.037 (.045)	-.132*** (.046)	-.132*** (.046)	-.097** (.046)	-.127*** (.045)	-.079 (.046)
Pharmaceuticals	-.042 (.046)	-.023 (.044)	-.056 (.051)	-.074 (.045)	-.058 (.045)	.083 (.045)	-.108** (.052)
Constant	-.445 (.920)	-1.622 (.911)	-.738 (.927)	-.460 (.928)	-.050 (1.007)	.088 (.955)	.350 (.995)
Sample Size	1,241	1,241	1,241	1,241	1,241	1,241	1,241
Model Chi square	.00	.00	.00	.00	.00	.00	.00
Percentage of Responses Predicted Correctly	69	69	69	69	68	68	69

Significant Level .01 denoted *** and .05 denoted **.

elasticity of demand for quality improvements, because the regressions were estimated with the natural log of both the price and consumption variables. For example, using equation 6, the income elasticity of demand for facility maintenance is -(.471/(-.493)) = .95.

To assess the reliability of contingent valuation measure, perhaps the most common test is whether or not the independent variables explain a considerable amount of the variance in the responses. In the cases of continuous responses, the rule of thumb is that the adjusted R^2 of an ordinary least squares (OLS) should be at least .15. [7, p. 213] In the case of the dichotomous responses, the results of the model chi-square test may be relevant. The model chi-square is a test of whether the likelihood of the observed responses, given the estimated equation, is greater than their likelihood given an equation with only a constant term. [22] A significance 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 Exhibit 6 show that the contingent valuation measure was reliable. The model chi-square tests show that the likelihood of the observed results based on the estimated equation was significantly greater than their likelihood based on an equation without independent variables. There is room for improvement, however, because the estimated equations predicted the responses correctly for less than 70 percent of the observations.

Note that the quality of care measures in these logistic regressions reflected how the respondents' experience with the quality of care at the nearest health facility affected their willingness to pay. In contrast to the analysis reported in Section 5.2.2, they did not measure willingness to pay. Interestingly, the experience with facilities with higher cleanliness scores significantly decreased the willingness to pay for five of the seven quality improvements, including facility maintenance.

5.1.3 Comparison of Results Across Improvements

Results of the logistic regressions were remarkably similar for all seven quality improvements, with two notable exceptions. The education of the respondent only had a significant positive effect on the willingness to pay for pharmaceuticals to treat ARIs and STDs, the two quality improvements with the highest estimated cost. Pharmaceuticals to treat STDs was the only quality improvement for which the willingness to pay was not significantly less for residents of Bangui than for residents of other urban areas.

5.2 TWO-STEP HEALTH EXPENDITURE METHODS BASED ON CURRENT HEALTH CARE EXPENDITURES

5.2.1 Median Expenditures for Health Care

As reported in Exhibit 4, median total expenditures for modern care were 1750 FCFA for individuals with expenditures. The median total expenditures at a facility (including transportation) were 1085 FCFA for individuals with expenditures at a facility. The latter statistic excludes expenditures at a licensed or unlicensed pharmacy for individuals with expenditures at a facility and observations for individuals who only had expenditures at a pharmacy.

5.2.2 Measures of Willingness to Pay for Quality of Care Based on the Analysis of Health Care Expenditures

One of the results of the national survey was to document the absence of pharmaceuticals in public facilities in the CAR and demonstrate how the market for health care has adjusted to their absence. As shown in Exhibit 3, public facilities had pharmaceuticals in stock to treat on average 1.7 of the five illnesses referred to in the contingent valuation questions, compared to an average of 4.2 for private facilities. [23] Pharmaceuticals were sold to many patients of public facilities, however, by licensed and unlicensed pharmacists. For example, licensed private pharmacies were located in the same town as the nearest public facility for 84 percent of the households in the national sample.

This result had implications for interpreting the coefficient for the availability of pharmaceuticals in the estimates of the two-part model. As explained in Section 2, the analysis of current expenditures sought to measure the curve D(P,L) and how it shifted in response to an improvement in the quality of care as measured by the quality of care variables. To the extent that the health care market had already responded to the demand for pharmaceuticals with the entry of private pharmacies, current expenditures measured the curve D'(P,L') rather than D(P,L).

In light of the changes in the market for health care, the two-part model was estimated for two types of expenditures: 1) all total expenditures for modern care, and 2) expenditures at facilities, including transportation. The results of both the logistic regressions for the probability of health care expenditures are reported in Exhibit 7 and the ordinary least squares regressions for the log of health care expenditures are reported in Exhibit 8.

In the estimates of total expenditures, none of the three quality of care variables were significantly related to the probability of expenditures and the cleanliness of the facility was negatively and significantly related to expenditures. Analyzed at sample means, the coefficient for cleanliness showed that individuals spent 281 FCFA less at facilities with a one point higher score for cleanliness. The ordinary least squares regressions that were estimated with the quality of care variables excluded people who purchased pharmaceuticals without visiting a facility and for whom the facility data were not applicable. For the sake of comparison, column 2 of Exhibit 8 reports the OLS regressions estimated without the quality of care variables. Coefficients of all of the independent variables were similar for both estimates, with the exception of the

Exhibit 7: LOGIT REGRESSION FOR THE PROBABILITY OF HEALTH CARE EXPENDITURES

INDEPENDENT VARIABLE	EXPENDITURES FOR MODERN CARE	EXPENDITURE AT HEALTH FACILITIES
Ln (Total Household Consumption)	.556*** (.094)	.373*** (.097)
Severity	.307** (.157)	.424 ** (.167)
Age of Patient	-.015*** (.004)	-.012*** (.004)
Male Patient	-.100 (.150)	-.056 (.158)
Education of Head of Household	-.012 (.021)	-.031 (.022)
Resident of Urban Area	.220 (.277)	-.874*** (.308)
Resident of Bangui	.710** (.351)	1.002 *** (.340)
Region II	.369 (.293)	.812*** (.308)
Region III	-.123 (.320)	.003 (.340)
Region IV	-.053 (.258)	-.070 (.298)
Region V	.581 (.327)	.413 (.347)
Ln (Distance to Nearest Public Facility)	.095 (.100)	.052 (.106)
Physician on Staff at Public Facility	.217 (.194)	.317 (.106)
Cleanliness of Public Facility	.034 (.053)	.041 (.056)
Pharmaceuticals at Public Facility	.036 (.070)	.074 (.070)
Ln (Distance to Nearest Private Facility)	-.107** (.056)	-.372*** (.061)
Physician on Staff at Private Facility	-.230 (.242)	-.275 (.264)
Cleanliness of Private Facility	.053 (.082)	.039 (.085)
Pharmaceuticals at Private Facility	.130 (.090)	.005 (.085)
Constant	-6.421*** (1.404)	-4.286*** (1.431)
Sample Size	879	879
Model Chi-Square	.00	.00
Percentage of Responses Predicted Correctly	67	72
Significance of Level .01 denoted *** and .05 denoted **		

Exhibit 8: OLS ESTIMATES FOR LOG HEALTH CARE EXPENDITURES

INDEPENDENT VARIABLE	EXPENDITURES FOR MODERN CARE	EXPENDITURES FOR MODERN CARE	EXPENDITURE AT HEALTH FACILITIES
Ln (Total Household Consumption)	.452*** (.070)	.495*** (.068)	.323*** (.106)
Severity	.406** (.127)	.460*** (.119)	.531*** (.189)
Age of Patient	-.021*** (.003)	.014*** (.003)	-.019*** (.004)
Male Patient	-.093 (.120)	.038 (.113)	-.348 (.176)
Education of Head of Household	-.000 (.016)	.010 (.015)	-.008 (.023)
Resident of Urban Area	.656*** (.159)	.671*** (.142)	.664*** (.260)
Resident of Bangui	.163 (.230)	.022 (.212)	-.124 *** (.358)
Region II	-.680*** (.213)	-.596*** (.192)	-.609** (.316)
Region III	.262 (.209)	-.177 (.186)	.010 (.335)
Region IV	-.448** (.209)	-.504*** (.186)	-.435 (.349)
Region V	-.821*** (.234)	-.518** (.221)	-1.086*** (.405)
Ln (Distance to Nearest Public Facility)	.258*** (.048)	.335*** (.040)	.174** (.072)
Physician on Staff at Facility Visited	.113 (.139)		.307 (.208)
Cleanliness of Facility Visited	-.157*** (.041)		-.157*** (.062)
Pharmaceuticals at Facility Visited	.025 (.040)		.277 (.064)
Constant	2.030** (.829)	.651 (.759)	2.310** (1.253)
Sample Size	370	547	239
Adjusted R2	378	.310	.254
Significance of Level .01 denoted *** and .05 denoted **			

constant term.

In the estimates of expenditures at facilities, again, none of the three quality of care variables were significantly related to the probability of expenditures. The availability of pharmaceuticals was positively and significantly related to expenditures. Analyzed at sample means, the coefficient for the availability of pharmaceuticals showed that individuals spent 342 FCFA more at facilities where an additional pharmaceutical was in stock, or 1710 FCFA more where pharmaceuticals to treat all five illnesses referred to in the contingent valuation questions. The coefficient for the cleanliness of the facility was identical to the one in the estimates with total expenditures and showed that individuals spent 156 FCFA less at facilities with a one point higher score for cleanliness.

5.2.3 Technical Validity and Reliability of the Measure of Willingness to Pay Based on the Analysis of Current Health Care Expenditures

To assess the theoretical validity, probability of expenditures and the log of expenditures were examined to determine if they were positively related to total household consumption. (As mentioned in Section 3, there was no independent variable for the price of health care, so this test was not available.) Results of the logistic regression reported in Exhibit 7 and the ordinary least squares regressions from Exhibit 8 show health care expenditures were consistent with other empirical evidence. Coefficients for the log of total consumption was significantly different from zero in all estimates. The income elasticity for units of health care was the sum of the income elasticities for the probability of expenditures and the log of health care expenditures: .667 for total expenditures and .602 for expenditures at facilities.

To assess reliability, the model chi-square was examined for logistic regression and the adjusted R^2 for ordinary least squares regression. Results in Exhibits 7 and 8 show that the health expenditure measure was reliable. The model chi-square test showed that the likelihood of the observed results based on the estimated equation was significantly greater than their likelihood based on an equation without independent variables. The adjusted R^2 was considerably greater than .15 for all of the ordinary least squares estimates.

5.3 COST OF EACH METHOD

Exhibit 9 shows the allocation of costs by type of question. The design and training costs for the contingent valuation questions were more than twice those costs for the health care expenditure questions. Conversely, the data coding, entry, and analysis costs of the health care expenditure questions was more than four times those costs for the contingent valuation questions.

Total cost of the study with both methods was 63.8 million FCFA. The cost of a study with only one of the two methods was the total cost minus the cost of the questions for the omitted method. Cost of a contingent valuation study was 51.5 million FCFA. The cost of the two-step health expenditure methods based on health care expenditures was 53.6 million FCFA.

Exhibit 9: COST OF THE NATIONAL SURVEY

TYPE OF COST/QUESTION	AMOUNT IN MILLIONS OF FCFA	PERCENTAGE
DESIGN AND TRAINING	20.0	31.0
Description of Household	3.0	5.0
Total Household Consumption	3.0	5.0
Health Status of Respondent	3.0	5.0
Contingent Valuation	8.0	13.0
Health Care Expenditures	3.0	5.0
DATA CODING, ENTRY AND ANALYSIS	21.4	33.0
Description of Household	1.1	2.0
Total Household Consumption	8.2	13.0
Health Status of Respondent	0.6	1.0
Contingent Valuation	2.2	4.0
Health Care Expenditures	9.3	15.0
NOT ALLOCATED BY TYPE OF QUESTION	22.4	35.0
Prepare Proposal	2.4	4.0
Field Activities	18.4	29.0
Write Technical Reports	1.6	3.0
TOTAL	63.8	100.0

Percentages by type of equation do not add to the subtotal by type of cost because of rounding. Percentages by type of cost do not add to 100 because of rounding.

6.0 COMPARISON OF THE MEASURES OF WILLINGNESS TO PAY FOR QUALITY

This comparison addresses the convergent validity of the two measures for willingness to pay. Convergent validity is the extent to which two measures that seek to measure the same underlying construct are correlated. [7, p. 191, 204] In the absence of a true measure as a standard of comparison, a correlation between the two observed measures validates both measures.

In this assessment, neither the contingent valuation nor the traditional economic measures were the true measure of willingness to pay for the seven quality improvements envisioned for the national user fee program. The contingent valuation measure was based on responses to hypothetical questions and the respondent did not actually spend money. Traditional economic measures of willingness to pay for facility maintenance and knowledge of personnel were not the true measures because there was no market for these quality improvements in the CAR; user fees were not related to these quality improvements, so even if a patient was willing to pay more for them, he/she would be unable to do so. [24] In the case of pharmaceuticals, for which a market existed, data on current health care expenditures included a broad range of illnesses with varying degrees of severity rather than the five illnesses referenced in the contingent valuation questions.

The contingent valuation and traditional economic measures of median willingness to pay for pharmaceuticals corresponded closely to each other. As shown in Exhibit 5, the contingent valuation measures of the median ranged from 1850 to 3730 FCFA, and the median of current expenditures for modern care was 1750 FCFA. To the extent that current expenditures measured the curve D'(P,L') and pharmaceuticals were the only aspect of health care quality reflected in the market for health care, the median of current expenditures was a lower bound estimate of median willingness to pay for pharmaceuticals. An alternative lower bound estimate based on current expenditures at a facility was 1710 FCFA, the additional amount individuals spent per episode of illness at a facility with pharmaceuticals in stock to treat all five of the illnesses referred to in the contingent valuation questions.

The two measures of median willingness to pay for facility maintenance and knowledge of personnel did not correspond to each other. The contingent valuation measure of the median was 2540 FCFA for facility maintenance, whereas the measures based on current expenditures showed individuals were willing to pay significantly less for care at facilities with higher scores for cleanliness. The contingent valuation measure of the median was 1815 FCFA for knowledge of personnel, whereas measures based on current expenditures showed that the amount individuals were willing to pay was not significantly different from zero.

7.0 CONCLUSION

Both the contingent valuation method and the two-step health expenditure methods provided valid and reliable estimates of the willingness to pay for pharmaceuticals, but not for facility maintenance or knowledge of personnel. The measures may have been more successful for the willingness to pay for pharmaceuticals for three reasons: 1) pharmaceuticals were more well-defined and concrete than the other quality improvements, 2) the CAR had an active market for pharmaceuticals that had educated the population about prices of pharmaceuticals, and 3) the market for pharmaceuticals provided valid data on current expenditures for them. The measures may be less successful in countries that have a less well-developed private market for pharmaceuticals.

Although both methods provided similar estimates of the willingness to pay for pharmaceuticals, further research is recommended to compare the methods. The relationship between user fees and quality of care will be central to health care finance in developing countries for several years in the future. The research reported here was among the first research on the relationship between user fees and quality of care and merits replication in other countries and for other quality improvements.

In the event that resource constraints limit researchers to choosing one of the two methods, the contingent valuation method is recommended. This method had the advantage of being easier to tailor to a specific quality improvement for a specific project under consideration, and was also less expensive than the two-step health expenditure methods. The contingent valuation measure had higher design costs than the two-step health expenditure methods; therefore, it is not recommended if adequate resources cannot be devoted to that phase.

Exhibit 10: PAYMENTS PROPOSED FOR EACH QUALITY IMPROVEMENT

	VERSION				
QUALITY IMPROVEMENT	A	B	C	D	E
Knowledge of Personnel	100	500	1,000	2,000	5,000
Facility Maintenance	100	500	1,000	2,000	5,000
Pharmaceuticals					
Treatment of Diarrhea	150	750	1,500	3,000	7,500
Treatment of Respiratory Infections	1,000	5,000	10,000	20,000	30,000
Treatment of Malaria	150	750	1,500	3,000	7,500
Treatment of Intestinal Parasites	300	1,500	3,000	6,000	9,000
Treatment of STDs	500	2,500	5,000	10,000	15,000

APPENDIX: CONTINGENT VALUATION QUESTIONS

CONTINGENT VALUATION QUESTIONS

INTRODUCTION

42. I would like to ask you some questions about the quality of health care in the public health facilities, specifically about:

1. maintenance of the health facilities
2. the technical knowledge of the health personnel
3. availability of pharmaceuticals

Supposing the health facility nearest you has all of the attributes at all times. Would you bring a someone who is ill for treatment at that facility?

1. yes 2. no /____/

I would like to make some proposals about your willingness to pay for health care per episode of illness. These proposals will help us to understand the value that you attach to health care. For each question, please tell us which of the following responses best represents your opinion:

1. I would not hesitate
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

VERSION /____/

HEALTH FACILITY MAINTENANCE

43. Given that your health facility is not well-maintained, without beds, mattresses, a delivery table, doors, etc., would you agree to pay X francs per episode of illness for maintenance of the health facility nearest you? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

44. IF RESPONDENT DOES NOT AGREE TO PAY, ASK:

Why would you not pay?

_____

_____

IMPROVEMENT IN THE KNOWLEDGE OF HEALTH PERSONNEL

45. To improve the knowledge of the health personnel, would you agree to contribute X francs per episode of illness at the nearest health facility for their supervision and training? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

46. IF RESPONDENT DOES NOT AGREE TO PAY, ASK:

Why would you not pay?

_____

_____

AVAILABILITY OF PHARMACEUTICALS

47. If your child has diarrhea today, would you agree to pay X francs for pharmaceuticals to treat it? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

48. If your child has a respiratory infection, would you agree to pay X francs for pharmaceuticals to treat it? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

49. If a member of your household has malaria, would you accept to pay X francs for pharmaceuticals to treat it? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

50. If a member of your household has an intestinal infection, would you accept to pay X francs for pharmaceuticals to treat it? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

51. If a member of your household has an a sexually transmitted disease, would you accept to pay X francs for pharmaceuticals to treat it? Which of the following responses best represents your opinion?

1. I would not hesitate /____/
2. I would go into debt to pay
3. I would pay if I had enough money
4. I would not pay

52. IF THE RESPONDENT DOES NOT AGREE TO PAY FOR PHARMACEUTICALS, ASK THE FOLLOWING:

Why would you not pay to treat these illnesses?

1. Diarrhea_____

2. Respiratory infections_____

3. Malaria_____

4. Intestinal illnesses_____

5. STD_____

NOTES

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4. Frankish, J.G. "Day Hospital Fees and Accessibility of Essential Health Services," South African Medical Journal, V. 70, (August 30, 1986), p. 286.

5. Ministere de la Sante Publique du Niger et la Cooperation Medicale Belge, "Financement des Medicaments par la Population: Experience de Tibiri (Dosso). Bilan Final," Projet RESSFOP, (Mars 1990), p. 12.

6. Ministere de la Sante Publique et des Affaires Sociales du Mali, "Projet Magasins-Sante. Rapport Annuel 1988," Projet FED, Medecins Sans Frontieres-Belgique. (1988).

7. For an introduction to the four types of contingent valuation questions, see Mitchell, Robert C., and Richard T. Carson, Using Surveys to Value Public Goods: the Contingent Valuation Method, (Washington, D.C.: Resources for the Future, 1989), p. 308-315.

8. For the cost calculations, see Barker, Brad, "Trip Report, Central African Republic," HFS Project, (January 26 to February 10, 1992).

9. Hanemann, W. Michael, "Welfare Evaluations in Contingent Valuation Experiments with Discrete Responses," American Journal of Agricultural Economics, V. 66, (August 1984), p. 332-341.

10. Cameroon, Trudy A., "A New Paradigm for Valuing Non-Market Goods Using Referendum Data: Maximum Likelihood Estimation by Censored Logistic Regression," Journal of Environmental Economics and Management, V. 15, (1988), p. 355-379.

11. My experience has been that significance tests with B and correct standard errors for B give similar results to those with B/k and the standard error for B/k.

12. Akin, John S., Charles C. Griffin, David K. Guilkey, and Barry M. Popkin, The Demand for Primary Health Services in the Third World, (Totowa, NJ: Rowman and Allanheld, 1985).

13. Gertler, Paul and Jacques van der Gaag, The Willingness to Pay for Medical Care: Evidence from Two Developing Countries, (Baltimore: Johns Hopkins University Press, 1990).

14. Manning, Willard G., Joseph P. Newhouse, Naihua Duan, Emmett Keeler, Bernadette Benjamin, Arleen Leibowitz, M. Susan Marquis, and Jack Zwanziger, Health Insurance and the Demand for Medical Care: Evidence from a Randomized Experiment, (Santa Monica: The Rand Corporation, 1987).

15. For an exchange on the relative merits of the two-part or four-part model and selection bias models, see the following articles:

Duan, Naihua, Willard G. Manning, C. N. Morris, and Joseph P. Newhouse, "A Comparison of Alternative Models for the Demand for Medical Care," Journal of Economic and Business Statistics, V. 1, no. 2, (April 1983), pp. 115-126.

Hay, Joel, and Randall P. Olsen, "Let Them Eat Cake: A Note on Comparing Alternative Models of the Demand for Health Care," Journal of Economic and Business Statistics, V. 2, no. 3, (July 1984), pp. 279-282.

Duan, Naihua, Willard G. Manning, C. N. Morris, and Joseph P. Newhouse, "Choosing Between the Sample Selection Model and the Multi-Part Model," Journal of Economic and Business Statistics, V. 2, no.3, (July 1984), pp. 283-289.

16. Some of our experience with estimates of the provider choice model suggested that the results from the sample selection estimates would not differ greatly from those reported here. In the estimates of the provider choice model, we tested for sample selection bias in separate equations for expenditures for each type of provider. There was not evidence of significant sample selection bias in any of the equations.

17. Grossman, Michael, The Demand for Health: A Theoretical and Empirical Investigation, (New York: National Bureau of Economic Research, 1972).

Grossman, Michael, "On the Concept of Health Capital and the Demand for Health," Journal of Political Economy, V. 80, (1972), p. 223-255.

18. Manning, et al. assume that el_i has a normal distribution and estimate the B/k2 with a probit algorithm. Our assumption of a logistic distribution and choice of algorithm may be theoretically incorrect, but in practice estimates of B/k2 with the probit and logit algorithms will be similar.

19. The CAR conducted a census in 1989 and is fortunate to have recent information on census tracts throughout the country that was the basis for the sample selection for this survey.

20. The survey design included 1280 households from 80 census tracts, but a team of interviewers was unable to conduct the survey in one census tract in health region II.

21. Weaver, Marcia, Robert Ndamobissi, Ruth Kornfield, Cesaire Blewane, Antoine Sathe, Michael Chapko, and Leon-Patrice Ngeuretia, "Willingness to Pay for Child Survival: Results of a National Survey in Central African Republic," Health Financing and Sustainability Project Technical Report, (April 1993).

22. For more information on these statistics, see SPSS Inc., SPSS/PC+ Update for V3.0 and V3.1 for the IMB PC/XT/AT and PS/2, (Chicago: SPSS Inc., 1989), p. B57-B58.

23. Note that it was a measure of whether the pharmaceuticals were in stock and not whether or not they were dispensed to all patients who should have been treated with them.

24. Although a presidential decree authorizes a fee schedule for outpatient visits on which user fees for physicians are higher than user fees for other practitioners, an November 1991 survey of health facilities showed that the fee schedule had not been implemented. National and regional hospitals and Bouar charged for laboratory exams and/or surgical procedures. Health centers only charged for health certificates with the exception of centers in Baboua and Ngayoundaye that had user fee/quality improvement programs. One or two private facilities may have had outpatient visit user fees that were higher for physicians than other practitioners, but only a small percentage of the sample had access to those facilities. For more information, see Ministere de la Sante Publique et des Affaires Sociales, "Les Systemes de Recouvrement des Couts de Sante en Cours en Republique Centrafricaine" (February 1992).