CHAPTER 2

THEORETICAL FRAMEWORK

This chapter reviews prior work on evaluating willingness and ability to pay, and proceeds to present a conceptual framework for the study.

2.1 Review of previous works on ability and willingness to pay

The literature on ability and willingness to pay for health care is examined in three stages; willingness to pay, ability to pay, and in combination, ability and willingness to pay.

2.1.1 Willingness to pay

Olsen and Donaldson (1993) studied the willingness to pay for public health care programmes in Northern Norway. They investigated whether the use of a different valuation method, based on WTP, could be used in valuing health care programmes. This was in terms of WTP per QALY gained. Donaldson and others (1994A) studied the use of willingness to pay alongside randomized trials. The use of WTP here was to provide an overall measure of the utility of quite narrow health care policy options of the sort that are evaluated within randomized trials. Donaldson and others (1994B) looked at the willingness to pay to avoid food-borne risk in the north-east of Scotland. The main focus of the paper was on the willingness to pay (WTP) results and how to use them in policy making. However, WTP was used here in gaining a more complete estimate of the benefits of preventing food borne disease.

Note: Ordinary least squares, Logistic and Tobit function in non-nested multiple regression models were respectively used to estimate the parameters in these studies. In summary, WTP in all these papers was used as a research technique in health care. The actual results were not used to assess prices for use in financing schemes (Donaldson, 1994), nor peoples' preparedness to invest their resources in health care. Therefore, no criteria was set for evaluating WTP, but only econometric methods were used to study the relationships between the variables. Apart from assuming that every person surveyed had the ability to pay, these studies were not designed to help policy makers to arrive at any conclusion about a community's ability and willingness to finance health care services.

Lavy and Quigley (1993) investigated the willingness to pay for the quality and intensity of medical care amongst low income households in Ghana by using survey data on illness and medical care. The estimates of the parameters of the utility function by using a nested logit function were used to investigate consumers' willingness to pay for medical services, and predict the elasticity of demand for health care. The use of willingness to pay here was to have a view of the private value of subsidized medical treatment, and the factors affecting the price consumers are willing to pay for medical treatment. It also assumed that all the surveyed people had the ability to pay. It was therefore only empirical research, and not for real life

application in determining the ability or willingness of communities to finance health care.

O'Brien and Viramontes (1993) analyzed whether willingness to pay was a valid and reliable measure of health state preferences. They did this by studying the construct validity and test-retest reliability of WTP in a survey of 102 persons with chronic lung disease, using personal interviews and eliciting WTP by a simple bidding game. Here, the WTP for a hypothetical intervention offering 99% chance of healthy lung functioning and 1% chance of death was assessed. This system called contingent valuation as they noted is becoming increasingly used in environmental and transport economics, and health care. They examined the issues involving contingent valuation. Amongst other things, they concluded that large variation in WTP responses may compromise this measure's discriminant validity. Also, asking a respondent to conceive a hypothetical market for health improvements is at best cognitively demanding. In their conclusion, it was stated that WTP methods will generate the most reliable data in minor disease, where the respondent already has some familiarity with consumer purchase.

Weaver and others (1993A) estimated the willingness to pay for quality improvements at public facilities in Central African Republic and also compared the use of contingent valuation and traditional economic methods in these measurements. The study was done so as to solve the policy problem of what combination of prices and quality improvements will lead to an increase in utilization of public facilities. Hypothetical quality improvement was used in contingent valuation, while 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. Both methods' median willingness to pay for pharmaceuticals corresponded to each other. In conclusion, they recommended that in the event that resource constraints limit researchers to choosing one of the methods, they should choose contingent valuation because it has the advantage of being easier to tailor to a specific quality improvements for a specific project under consideration. It also has the advantage of been less expensive than the traditional economic methods.

2.1.2 Ability to pay

Ainsworth and others (1985) in studying the cost recovery for health and water projects in rural Mali investigated the household ability to pay and organizational capacity of villages by conducting household surveys using questionnaires and looking at indicators like value of crops, value of livestock, cash expenditures e.t.c. Additionally, they consulted records of past household surveys. Wanmali (1985), in his study in Taluka, India examined the factors affecting the ability to pay in rural households fully. He looked at the interaction of several spatial and socioeconomic factors in the study area. Regression analysis was used to study the effects of some of these factors and frequency of use of services.

2.1.3 Ability and willingness to pay

Hongvivatana and Manopimoke (1991) looked at the preference for rural health insurance. They used a combination of qualitative and quantitative methods to ascertain households' ability to pay. Contingent valuation was used to reveal the households' willingness to pay for health insurance premium. They divided the people surveyed into three categories of WTP depending on their answers and expressed the result as percentages. The categories were; willing; conditional; and not willing. They also studied the rural households' willingness to pay for different levels of health insurance premium. In conclusion, they stated that their findings though not based on actual behavior, clearly indicated the existence of a substantial level of demand for voluntary health insurance in the rural sector.

Russel and others (1995) reviewed why there is more interest in willingness to pay (WTP) studies and provided some examples on how they could be conducted. It was noted in the paper, the need for caution in interpreting results as the WTP method is still in an experimental stage of development. They acknowledged that in orthodox economic theory, there is no conceptual distinction between ability and willingness to pay. However, they pointed out that ability to pay does require further analysis, since payments for health care might, for example, be based on asset sales causing long-term declines in household welfare.

Weaver and others (1993B) studied the population's willingness and ability to pay for quality improvements through a national survey in Central African Republic, since the government wanted to introduce user fees for public facilities. Willingness to pay was measured by both contingent valuation and a comparison of current expenditures, while ability to pay was measured by willingness to pay as a percentage of monthly house hold consumption. The study examined differences in willingness and ability to pay for health care between urban and rural areas and across health regions. All of the analyses were conducted with the sample median rather than the sample mean, because the distribution of consumption was skewed by a few house holds with unusually high WTP and the median then was a more representative statistic under these circumstances.

2.1.4 Conceptual issues in all these A/WTP studies- a critical review

As seen above, there have been many studies in the related field of WTP either using contingent valuation methods (Olsen and Donaldson, 1993; Donaldson and others, 1994A & 1994B; Weaver and others, 1993), or traditional economic methods (Lavy and Quigley, 1993; Weaver and others, 1993). These studies however, were only used for research purposes and not to arrive at a definite conclusion on peoples' ability and willingness to financially support health care services nor to set fees for such services. A study by Weaver and others (1993) that was partially used to determine the ability and WTP of households for improved government services was inconclusive.

However, the study by Hogvivatana and Manopimoke (1991) stands out clearly as the only one where the result was used to arrive at definite policy guidelines.

The concepts explored in those studies were largely experimental, and therefore presented some flaws which this study will try to avoid. The flaws included either using unrealistic hypothetical markets or unreasonable health outcomes for the contingent valuation. Most importantly, behavioral aspects and present or anticipated health status of the consumers were not incorporated as direct determinants of WTP. Some studies that used behavioral and health status aspects used them only to explain the WTP figures they got. Many models for estimating WTP were also complex, thereby limiting their usefulness as operational tools.

Also, the issue of ability to pay was not explored fully or estimated separately since these studies assumed that the people had the ability which is misleading especially in developing countries. In some cases, ability indicators like consumption and or income were included in the WTP estimation as explanatory variables. Only Weaver and others (1993) tried to address this issue by estimating ATP separately, but used willingness to pay as a percentage of total consumption to determine ATP which is a narrow way of looking at things. This is because past consumption patterns could have been due to borrowing or selling of assets which people may not be willing to do for some health care services like endemic disease control.

One feels that it was to develop a better measure of WTP that Cameron (quoted in Weaver and others, 1993A) developed a technique for estimating WTP from WTP function itself instead of through the indirect utility function.

Reviewing the technique (Weaver and others, 1993A)

Let WTP be a function of a vector of independent variables such as total household consumption, education, and health status.

For individual i, it is

$$WTPi = Xi'A + Ui \qquad (2.1)$$

where
Xi = vector of independent variables
A = vector of unknown parameters
Ui = random term with a logistic distribution with mean 0 and variance c.

WTPi was not observed, but the responses to the contingent valuation questions revealed whether or not the price quoted in the questions ti was more or less than WTPi. The responses were represented by an indicator variable Ili, where

$$Ili = 1 \text{ if } WTPi > ti \qquad (2.2)$$

Ili = 0 otherwise

$$\text{Prob (Ili=1)} = \text{Prob (WTPi>ti)} = \text{Prob (Ui>ti-Xi'A)} \quad (2.3)$$
$$\text{Prob (Ili=1)} = 1-\text{Prob (Ui/k1 <-(ti-Xi'A/K1)}$$

Through censored logit likelihood function, estimates of -1/K1 can be used to identify A.

$$A = -(A/K1)/(-1/K1) \quad (2.4)$$

When the logit is estimated with only the vector of A and a vector ones, the estimate of A for the constant term is the median WTP.

The authors stated that the technique has limitations but did not mention them.

This technique by Cameron did not address the issue of behavioral factors and the effect of the vector of independent variables. Also, an issue regarding ability like consumption was integrated into the equation. The model is also complex and cannot be used by non experts as an operational tool.

Another major drawback of all these studies was that none specified any uniform criteria, for making definite decisions or arriving at concrete conclusions about the ability and willingness of individuals to financially support health care services.

Those methodologies developed therefore cannot be used to give practical solutions, and will not be quite useful in endemic tropical disease control especially in rural areas with all the difficulties in conducting studies there.

2.2 Conceptual framework

This study will develop a practical and easy to use approach for determining whether communities have the ability and willingness to bear the cost of onchocerciasis control with ivermectin. The terminologies for this new approach choice will be ability to finance (ATF) and willingness (WTF) to finance. This is to indicate their more versatile and multi-dimensional nature when compared to the regular willingness to pay (WTP) approach. WTF will be an index of consumer choice, while ATF will be an index of the consumer's budgetary constraints. However, techniques of the WTP approach will be incorporated into the design of this approach.

In the design of this new approach, ability to finance and willingness to finance will be treated as separate though related issues and thus always estimated separately. However, the results will be combined using a criteria to be developed to arrive at conclusions. Also behavioral and health status factors that can affect the consumer choice in financing onchocerciasis control with ivermectin will be modelled. There will be a fusion or amalgamation of traditional economic methods and contingent valuation in the approach. Traditional

economic methods will be used mainly in issues concerning ATF, while contingent valuation will be used to determine WTF.

Two frameworks are presented; consumer choice with respect to ability and willingness to finance, and operational procedures for modelling and evaluation.

2.2.1 Consumer choice

This research attempts to continue from where the previous studies in the related field of willingness to pay stopped, as seen from the literature review. However, as was seen in the critical review of the conceptual issues in those studies, they all had their merits and demerits. These will provide a lead and guide into the concept of ATF and WTF.

One of the criticisms of the WTP approach is that people will not reveal their true preferences, or the actual amount they are willing to pay. This is because only price is considered as the WTP valuation yardstick. Using only the amount people say they will pay has given inconsistent and sometimes illogical and unreliable results in previous studies.

According to Russel and others (1995), while the amount provides a link between cost and demand, the cost may not be equated to the consumer's value of the service offered. The problem is that human beings can play tricks in revealing their preferences when known benefits or loses are involved (Sher and Pinola, 1985).

These authors also noted that up to now, economists and psychologists have been unable to develop an additive cardinal system to measure individual preference reliably.

Samuelson (quoted in Culyer, 1985) in his theory of choice which he called Revealed preference theory sought to remove any un-observable basis from economics and to use only behavioral and observable elements.

Therefore, using observable behavioral and health status factors plus the amount of money people say they are willing to expend as determinants of a broader measure (WTF), one will have a more objective indication of whether an individual or a community is really prepared to finance health-care services. The logic behind consumer choice is expected to be explained or understood better if these multiple factors are included.

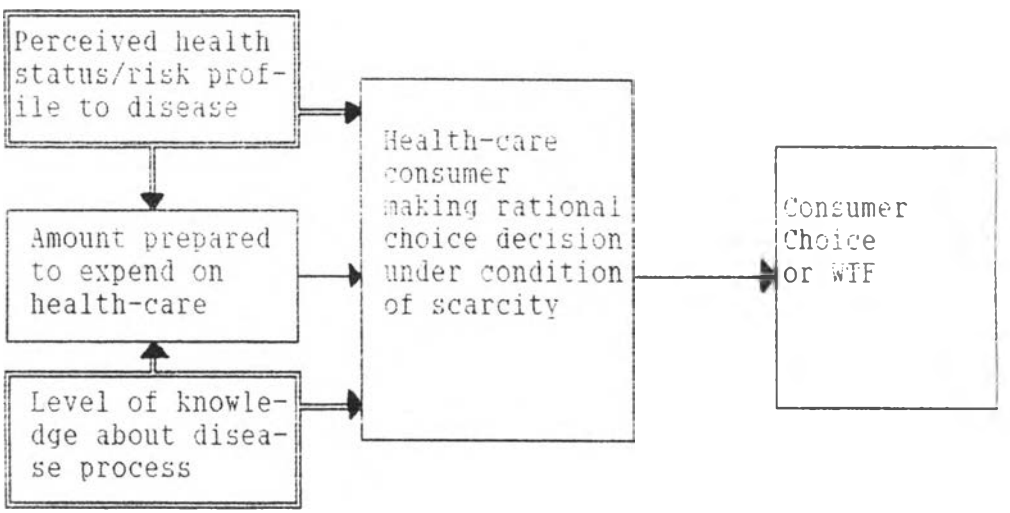
This is from the consumer choice theory where it is known that each consumer will spend his or her limited budget in the way that yields the greatest amount of satisfaction or utility. In the same vein, Adam Smith (quoted in Culyer, 1985) wrote that the price of a commodity somehow depends on what that good is worth to consumers.

In this study, the amount people are willing to pay or contribute will become one of the causal variables of WTF, amongst behavioral and health status factors.

Why Behavioral and health status factors in the new approach?

Figure 2.1 Diagram illustrating the multi-dimensional factors influencing the choice of a preventive health-care consumer.

This illustration is on the assumption that the consumer has the ability to pay/contribute though his/her budget is limited.



WTF as the index of consumer choice is influenced by many behavioral and health status factors which affect how the rational consumer who wants to maximize utility views his condition. These factors also determine the amount of money he is prepared to expend to get maximum satisfaction. Therefore considering the amount alone and holding the other factors constant will not be a satisfactory measure of consumer choice in endemic disease control.

Rather, it must be combined with these factors that really determine consumer choice in order to get a clearer indicator. This is because some individuals may quote an amount of money they are prepared to expend, but when it is viewed against the backdrop of their behavior and health status, it becomes both irrational and unrealistic and hence misleading. Even when it can be ascertained that a person is suffering from the symptoms of a physical disorder, the decision to seek professional help and the simultaneous choice of provider are matters partially determined by an individual's psychological and cultural disposition (Akin and others, 1985).

Also according to the same authors, knowledge and beliefs about sickness, good habits, living conditions, and medical practitioners are

central determinants of the demand for health care services. This shows that one must have a holistic/global look of the consumer to really determine his preference. If someone offers to pay a large amount but this is contradicted by factors in his health status and behavior, then of course he will not be taken serious and vice versa.

Therefore, a combination of the amount people say that they will pay and some behavioral and health status factors as causal variables should give a more objective estimate of consumer choice to be known as WTF. These factors will be identified and appropriate scale of measurement designed.

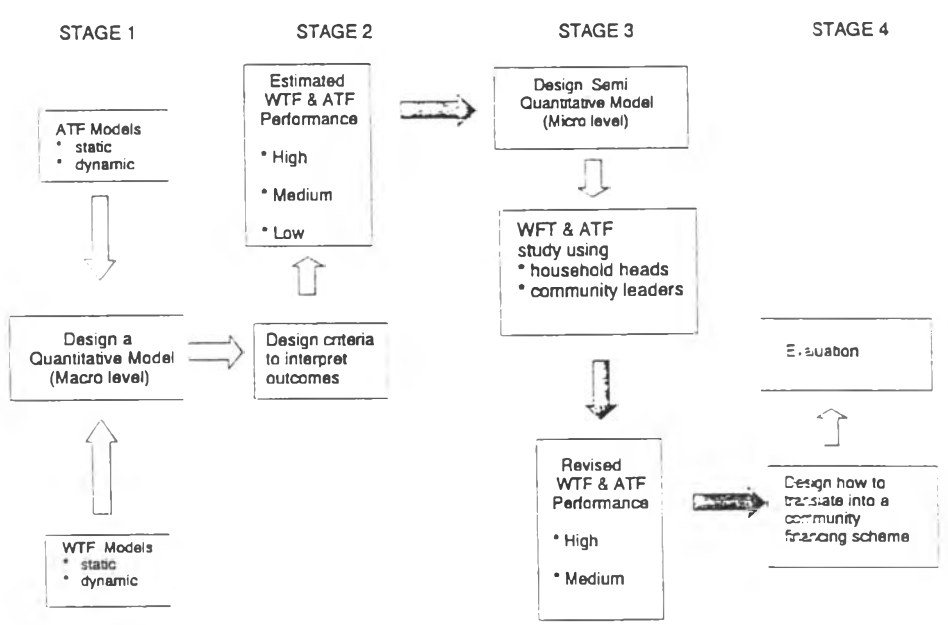
In like manner, multiple factors determining the budgetary constraints will be considered in valuing the ability of the people. Using consumption and or income will be misleading in developing countries because in reality they are difficult information to get, especially in rural areas and for people working in the informal sector.

A holistic view will be adopted in this study and more factors determining ability will be identified, measured and thereafter combined to give a better measure of ability to be known as ATF.

2.2.2 Operational procedures

The procedures to be used in meeting the three objectives (section 1.4) are presented in figure 2.2.

FIGURE 2.2 An outline of the operational procedures for the study



A brief explanation of the key steps in figure 2.2 are the following:

The Quantitative Model

The study will start by designing a quantitative model for macro level study. It is comprises of WTF and ATF functions. Both WTF and ATF will be indices of some causal variables.

It is a model that can be used by either the National Onchocerciasis Control Programme (NOCP) or any funding agency interested in supporting community financing in deciding on which communities that have the ability and willingness to implement and sustain the scheme.

Macro-level study implies study at the national, health zone, state, or local government level.

ATF and WTF will be estimated from separate equations in contrast to all previous WTP studies, where factors influencing ATF were included as variables in WTP equations in line with mainstream economics thought.

Russel and others (1994) pointed out the necessity of having separate estimates especially in poor countries. Also including ATF in WTF equations will cloud all the issues of a community's ability since only consumption and or income will be included.

In the same vein according to Blumenfeld (1990), a model intended to assist in the development of a scheme for community financing, would incorporate variables accounting for the community's ability to raise funds. However, it generally would not consider the variability of world's commodity markets, even though in the long run, these would play a role in determining the community's income.

Models for ATF and WTF in both static and dynamic conditions will be designed, bearing in mind the possible factors that interplay in both conditions.

The general specification of WTF in the Quantitative Model

$$WTFh = \text{summation of causal variables} + u \qquad (2.5)$$

$$\%WTFh = WTFh/\text{maximum WTF} * 100 \qquad (2.6)$$

WTFh = WTF of a household h
u = error term

The causal variables will include the amount people are willing to pay/contribute, and some relevant behavioral and health status factors. WTFh will be calculated as a percentage to imply the level of consumer choice. The summation of all WTFh in a community will equal

the choice of that community. The above general specification is applicable to both the dynamic and static conditions. The variables will be modified depending on which condition that one is considering.

The error term is added because it could arise from the following sources according to Maddala (1989):-

1. Unpredictable element of randomness in human response.
2. Effect of a large number of variables that have been omitted.
3. Measurement error in the dependent or effect variable.

The general specification of ATF in the Quantitative Model

$$ATFh = \text{summation of causal variables} + u \quad (2.7)$$

$$\%ATFh = ATFh/\text{maximum ATF} * 100 \quad (2.8)$$

ATFh = ATF of a household h
u = error term

The causal variables will take a complete view of all possible factors that can give an indication of ability to finance the provision of all types of services, and not just health care services.

ATFh will be observed as a percentage, and the summation of all ATFh in a community will equal its ability.

The above general specification is applicable to both static and dynamic conditions.

Integration of the WTP technique

The WTP technique will form an integral part of the steps in exercising the quantitative model. It will be used to calculate the amount households should pay/contribute, and also to test the relationship between various variables.

The Multi-Dimensional Criteria

An index will be used as a criteria for classifying the communities into low, middle or high performance communities depending on their WTF & ATF scores. The criteria will also be used for the confirmation of ATF and WTF using the semi- quantitative model.

Multiple indices are also used as criteria in valuing health status as in Disability adjusted life years (DALY) measurement. (Murray, 1994). The author noted that since Sullivan in 1966 and 1971 proposed a composite index of health status, there has been extensive debate on how versatile such indicators of health status can be.

He however argued that for his purposes, the extensive debate on the value of constructing single indicators can be reduced to a basic choice between explicit and implicit valuations, and the desirability of making implicit values explicit.

So also in this research, the controversy of using single composite indicators for ability and willingness and combining them in a single index in order to make decisions about a community will be secondary.

Of prime importance will be the use of the criteria to make explicit, objective, and reliable decisions about the level of community financing capability of a community.

The Semi-Quantitative Model

This brings the study to the stage three which will be the design of a semi-quantitative model for micro-level study.

Micro-level study implies study at a community level alone, and it is for the purpose of confirming ATF & WTF and translating the results into a suitable community financing scheme.

It is semi-quantitative because it will draw from the design of the quantitative macro-level study model, and additionally incorporate a lot of qualitative techniques like personal interviews with key people, focus group discussions and observations.

The unit of analysis will be household heads and community leaders. ATF & WTF will also be expressed as percentages.

Rifkin (1992) outlined the advantages of combining qualitative and quantitative methodologies to provide the best assessment of a health situation and the possible interventions. She also noted the advantages of using household heads and community leaders as key informants.

Model Community Financing Scheme

The next stage of the approach will be the design of a model community financing scheme, through translation of the results from the semi-quantitative study.

All the ingredients for a successful scheme will be included. Also, the sources of funding, how much to collect, methods for management of funds, and avenues for support will be addressed. Community self-drug delivery methods will be designed.

Evaluation

Simulation modelling will be used to evaluate the quantitative model. The other stages can only be evaluated after contact is made with the communities.