



CHAPTER 4

DEVELOPMENT OF THE APPROACH

In this chapter, the quantitative and the semi-quantitative models, together with the study tools needed to complement them will be developed.

4.1 Introduction

The corner-stone of this study will be the formulation of an appropriate quantitative model comprising of ability to finance (ATF) and willingness to finance (WTF) functions. Since both are attributes relating to preferable utility states and the budgetary constraints to attaining such states, both functions will therefore be derived from the utility function.

While WTF will be derived from the utility function itself, ATF will be derived from the budgetary constraints of the utility function.

The basic principles of the expected utility theory which lie at the center of neoclassical demand theory will be used as a general guide in this research. The theory involves a rational economic person faced with choice under uncertainty over which he, as the consumer is sovereign. (McGuire and others, 1988).

The same authors also stated that risk is introduced by suggesting that there are various states of the world, all of which are known with certainty, and to which it is possible to attach probabilities of occurrence.

Taking a world of certainty, it is assumed that the consumer is involved in a number of acts, the property rights over which are vested in that individual like: (a) judging the cost of consumption; (b) bearing the cost full at point of consumption; (c) judging the benefit -- the fully informed, rational, sovereign consumer determines the utility gains associated with the consumption; (d) obtaining benefit -- the consumer receives the utility gains directly from the consumption; and (e) decision-making -- on the basis of (a) to (d), the fully knowledgeable, rational, sovereign consumer chooses whether, and if so how much, of what to consume.

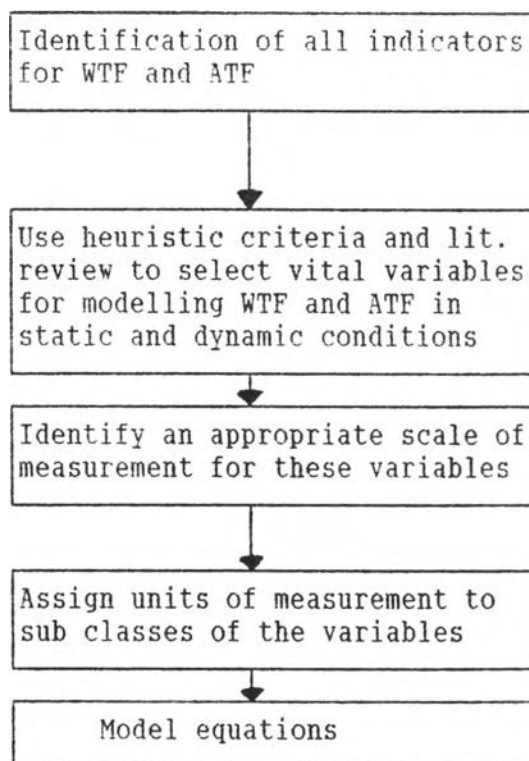
It is however noted that due to the asymmetry of information in the health care field, there may be uncertainty generated by ignorance about health status, or availability and effectiveness of treatment, etc making decision making difficult. (McGuire and others, 1988). This aberration though is not strong enough to counter the points (a) to (d) mentioned above when applied to the control of endemic diseases. This is because sine the disease has been with the people for a long time, most of them should have some knowledge about it. They can also the judge the utility they can derive from its control. Making the wrong decision will not have overtly adverse health effects on them. The market failures are more pertinent in curative services, especially in acute cases.

Points (a) to (d) are some of the major issues relating to the

consumer choice, or factors affecting the willingness of an individual to finance onchocerciasis control with ivermectin, in order to maximize utility. The limitation to achieving this utility maximizing objective is budgetary constraints, which is related to the issue of ability to finance. Hence, these points affecting decision making by a consumer will be modified to suit the objective of this research in deriving the willingness to finance function. On the other hand, the holistic factors determining budgetary constraint will also be modified and used to derive the ability to finance function.

The summary of the steps of the development of the WTF and ATF models are presented in figure 4.1.

FIGURE 4.1 Summary of steps in the development of the WTF and ATF models



4.2 Variables influencing ability to finance and willingness to finance

This starting point of the research will focus on selecting the specific variables for ability to finance and willingness to finance that will be included in the models of the approach, from the multitude of indicators which can affect them.

These multitude of indicators are;

ATF (STATIC AND DYNAMIC)

1. Personal income, 2. Household income, 3. Expenditure on medical care and on food, (all monthly average figures). 4. Ownership of property, 5. Savings, 6. National income, 7. Previous years' ATF, 8. Change in income.

WTF (STATIC AND DYNAMIC)

1. Level of knowledge about onchocerciasis, 2. Priority ranking of onchocerciasis, 3. Absence or presence of clinical onchocerciasis disease in an individual/household member, 4. Procedure for the collection and management of the contributions, 5. The maximum amount an individual is willing to pay/contribute, 6. Age, 7. Risk of an individual or household member contracting onchocerciasis, 8. Occupation, 9. Gender, 10. Educational level, 11. Number of children in the household, 12. Previous years' WTF, 13. Success rate of the community financing scheme.

It is logically clear that it will be impractical to use all the above identified indicators, and hence the necessity for the selection. Another reason for the selection is to make the model simple and practical and hence, subsequent data analysis easy.

The major criterion for the selection will be to use only the indicators that have high expected impact on ability and willingness to finance. The inclusion criteria for the selection will be the indicators that act on the three building blocks of consumer choice as identified in figure 2.1 for WTF. In the case of ATF, it will be the indicators that have direct influence on a household's budget.

4.2.1 Ability to finance (ATF)

The five variables to be discussed below are not exhaustive of the determinants of the ability of a household as was seen in the above section. They are however assumed to be the key determinants and their subsequent valuation will definitely tender the level of a household's ability to finance, and also make ATF measurement on the field easy, practical, and meaningful.

1. Household Income (Yh)

Household income rather than personal or individual income should be considered. This is because as Miners (1979) (quoted in Akin and others, 1985) noted, the family should be viewed as the fundamental unit of analysis because of interactive effects and constraints within the household.

Income could be looked upon as a cardinal determinant of a household's ATF. A rise in income is expected to cause an increase in the consumption of goods, including health care if they are normal goods.

Therefore, an income level higher than a certain cut-off point will enhance households' ATF, because it means that not only do they have enough to spend on basic needs and leisure, but they also have some left to spend on health care especially on preventive care. The cut-off point to be used in this study is the official minimum wage of public servants in Nigeria which is #1,000.00 per month. (# = Naira).

Income here will be expressed in monetary terms. Non-cash income will be monetized and subsequently expressed in monetary term. This is to have a uniform value of measurement for income, and to get the real value of what households earn.

According to Akin and others (1985), it is essential to measure non-cash income in Third World countries. This is because income from these sources may free up cash income to be spent on discretionary purchases of market goods such as medical care. As the authors noted, a rural household with a low level of cash income may consequently be found to spend it quite freely for drugs and medical services because the cash is not needed for meeting day to day necessities. Also, the communities may be willing to accept non-cash contributions from households for their ivermectin fund.

It is generally known that information about income is very difficult to get from households. In a WTP study by O'Brien and Viramontes (1993), the question with the greatest number of refusals was household income, and this occurred in 10% of the respondents.

There may be seasonal variations in the income of some people especially farmers. In that case, the average of the two highest and two lowest income-earned months should be used.

The reference point for expected minimum household income will be #2,000.00 per month on the average. #1,000.00 is the minimum wage for public servants in Nigeria. It is assumed that at least 2 people in a household should be earning income, thereby bringing the total household income per month to #2,000.00.

2. Expenditure on Health care (Eh)

Households as noted in the introduction spend a lot of funds on health care, and some of this expenditure is not effectively used. In Thailand, an average of \$7.70 per person is spent annually on health care and medicines (Akin and others, 1985). Though the data from Nigeria is not available, it is likely that private expenditure may be about this same figure. When multiplied by 6 (the average number of people in a household), one then has an idea of the average annual expenditure on health care. However, it is assumed that under normal circumstances, households in Nigeria spend about 10% of their income on health care.

The amount expended on health care is also indicative of the ability of a household. Even when the stated household income is low but the expenditure on health care is high comparatively, then either that the household gave a wrong information on their income or that their health

care need is high. All in all, a household whose expenditure is equal or above the average monthly/yearly national estimated expenditure on health care should have the ability to finance ivermectin procurement.

3. Expenditure on Food (Ef)

This includes money spent in the market to buy food, and the monetized value of home produced and consumed food items like chicken etc. Households are assumed to spend about 50% of their income on food. It is clear that an expenditure on food that surpasses or is equal to the above stated level will mean an able household.

4. Ownership of Property (Op)

This is measure of wealth and it is normally highly correlated with income. Ownership of property gives an indication of the ability, since income is sometimes transient. Therefore depending on the type of property a household owns. the level of ability could be deduced.

5. Type of Savings (Ts)

This a proxy variable for the amount of savings a household has. This is because while nobody will readily reveal the amount of savings he/she has. the type of saving scheme they are patronizing will give an indication on the amount of savings they have. Savings is a form of asset and it might imply an enhanced capacity of households to use health care services and possibly to afford higher quality services than income alone suggests (Akin and others, 1985).

The various types of saving mechanism gives an indication of how much someone has.

Thus, household members with little savings usually save with friends in a special type of scheme. Here, on a monthly basis, everyone gives his/her contribution to one member of the group and the person receiving for that particular month is free to spend the money in any manner. Each month, they rotate who should receive the collection and the cycle goes on and on. The aim of this saving scheme is to raise bulk money for each member of the group to use for "major" ventures. The amount involved as monthly contributions is usually small. Some save in their homes.

The next level is saving with cooperatives. People with more money cooperate and form a cooperative society which they register with the government. The society can go into any venture like trading, farming, small scale manufacturing etc. The profits are usually shared among the members.

Most people that have a lot of money save with the banks. The procedural issues in banks inhibit people with little savings from saving with banks.

There are of course exceptions to the rules above. For example, some rural households with a lot of money save in their homes. Also, some people with little amount of savings keep their money in the banks. These are however minor aberrations to the general norm.

4.2.2 Willingness to finance (WTF)

As was the case with ATF, the variables below are not exhaustive of the determinants of the level of willingness. They were selected based on the assumption that they are the key determinants. An added factor was the necessity to make the model simple and practical.

1. Level of knowledge about onchocerciasis (Lk)

Knowledge and beliefs about sickness, good health habits, living conditions, and medical practitioners are central determinants of the demand for health care services (Akin and others, 1985). Therefore, since willingness to finance is actually concerned with whether households are prepared to invest funds in onchocerciasis control with ivermectin, their level of knowledge about the disease and its associated factors becomes of cardinal importance.

This is because someone will not be inclined to invest funds in something he has no prior knowledge of, and therefore is ignorant about the possible outcome. Knowledge as seen from the expected utility theory is what makes a consumer to judge the benefit or utility gains associated with consumption, and it is one of the basis that the sovereign consumer chooses whether to consume. In this particular instance, it is choosing whether to finance onchocerciasis control with ivermectin which he/she will consume.

Level of knowledge will be measured using a series of questions regarding the aetiology, manifestations of the disease, and treatment. The information generated will be combined and coded in order to give a households' and or person's level of knowledge.

2. Priority ranking of onchocerciasis (Pr)

How important the disease is to a household will obviously play a vital role in determining its willingness to finance the control.

An axiom found in the theories of choice, whether by Hicks or Samuelson (Culyer, 1985), and the expected utility theory (McGuire and others, 1988) is that of completeness or comparison. In this case, the consumer is able to order all available combinations of goods according to his/her preferences. By drawing this scale of preference for health care services, a household will obviously choose to satisfy their wants and needs top on the scale first due to scarcity of resources. An idea of where households rank onchocerciasis in their scale of preference, will serve as a pointer to their willingness to finance its control.

It has been noted that many community financing schemes failed

because the priority of the community was not considered. This is because there may be other concomitant endemic diseases and basic needs problems that the community may want to tackle first. Also, the disease has been endemic in the communities for many years and they may no longer regard it as a threat but just as a minor disturbance.

It has been repeatedly observed in Third world countries that little attention is paid to illness because almost everyone is suffering from some sort of disorder. As a consequence, it is suggested, there is little perceived need for preventive care and there is strong acceptance of fate in the reaction to accidents and sickness. (Akin and others, 1985).

Therefore because of all these observations, it is important to consider the priority of the communities.

3. Presence of clinical onchocerciasis in an individual or household member (Pc)

This is more of a normative need. It is expected that the presence of disease manifestations will increase or enhance the willingness to finance, because the expected utility associated with the choice will be high.

4. Risk of an individual or household contracting onchocerciasis (Rc)

This is perception of future need by the people. If the household perceives no future need, then the willingness to finance will be lacking. 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 providers are matters partially determined by an individual's psychological and cultural disposition (Akin and others, 1985). It is also determined by the person's level of knowledge, and priority given to health.

Therefore, what constitutes a risk to a health care provider may not be so to the households. Perception of risk hence becomes a strengthening evidence to factors already mentioned in influencing decision-making by the consumers.

Finally it is worthy to note that variables 1 to 4 are measures of behavioral changes necessary to give WTF. Though psychometric studies are few (O'Brien and Viramontes, 1993), it is necessary to combine these factors with Aw for one to get a good measure of WTF. There are weaknesses in this method but the strengths are more.

Such techniques of approximating physical and or behavioral attributes are used in many accepted measures of utility like disability adjusted life years (DALY) and quality adjusted life years (QALY). One therefore expects increased effectiveness of disease control measures and programmes through integration of human behavioral factors in programme design and management (Rosenfield, 1986).

5. The maximum amount a household is willing to pay or contribute (Aw)

This is the ultimate test of whether a household is willing to finance. The yearly amount needed as determined by Akpala and others (1993B), but has been modified for the purpose of this study was between #20.00 and #50.00 per person. Therefore any contribution below this range for all eligible people in a household is indicative of low willingness.

The amount the households eventually contribute is the most objective measure of their willingness to finance. However in this case, they are still being asked how much they are prepared to pay or contribute, and the amount they state may not be the real amount that they will pay when the chips are down.

4.3 Scale of measurement for these variables

One of the more vexatious problems in the theory of consumer behavior is measuring or representing the subjective views of consumers (Sher and Pinola, 1986). According to the authors, a realistic approach employs an ordering method rather than an absolute scale for measuring utility and valuing different goods, because such an absolute scale has more restrictive assumptions. However, the intent is not to go into the controversies between ordinal and cardinal utility measurements. Rather, it is to decide on a scale of measurement that will give the most valid and objective measure for the variables under consideration.

In this connection, Interval scale will be used in the measurement. The willingness to finance variables are actually measures of utility states. The utility theory does not have any ideological commitment to a particular source for identifying the utility scales (Culyer, 1985).

Also according to the same author, the interval scale can be used in measuring utility when one seeks to do more than just indicate order of preference and when in particular one wants to say something about the rate of increase or decrease of utility. He also pointed out that utility theory is any theory that uses numbers to represent a person's or a group's order of preference. Samuelson's theory of choice quoted by the same author does assume that choices or preferences can be ranked.

The scale is numerical between 1.00 to 4.00, and the numerical difference between two numbers is a measure of difference in the underlying property. However there is no absolute measure since zero is arbitrary. It is accepted that attaching weights to variables carries some subjective bias. Nonetheless, an attempt has been made in this study to decrease the bias by ensuring that the weights give as much objective measurement as possible. This will be made clear in the next section where the interval scales' measurement and weights attached to all variables are illustrated.

The interval scale will also be used in measuring the ability to finance variables, and the differences in the intervals in this instance

will also represent the differences in the underlying properties of the variables.

Four measures namely 1.00, 2.00, 3.00, and 4.00 will be used. The difference between them is a measure of the difference in the underlying property of the variables. From 0 to 2.00 is low, 2.01 to 3.00 is middle, and 3.01 to 4.00 is high on the scale.

The rationale for adopting this simple scale, is to have a uniform measure for all the variables so that WTF and ATF can be calculated easily. Also, it will make the measurements to be practical and hence, easily done by local people and non-experts.

More categories are assigned to the low group because it is assumed that most people have low ability in Third world countries and therefore giving it two levels of measurement weights will capture this characteristic more. In the case of WTF, it is assumed that since the disease is endemic and the households may have resigned their fate to God, there may be more categories of low WTF than the other categories.

A controversy is who should make value judgements about weights to be attached to the variables. Some suggest using a Delphi technique, or Thurstone and Edwards scales or a Nominal group technique by convening a board of experts. In the case of DALY, the weights for the six classes were chosen by a group of independent experts unrelated to the estimation of any individual disease (Murray, 1994). In this vein, the measurement scale and weights used in this study are tentative, and can be modified in the light of new information or observations.

Finally, note should be taken that some other measures for the variables were considered, but dropped for obvious drawbacks. Two of such discarded measurement scales are the following:

1. It was considered assigning weights of 0.25, 0.50, 0.75, and 1.00 to the sub-classes of each variable. This idea was dropped because it will make data entry, analysis, and interpretation quite complex. Moreover, it did not make the measurements to be more sensitive.

2. It was also considered having an interval measure that is continuously numerical between 0.01 to 4.00. This is with five sub-classes for each variable, and with each sub-class having the same interval as the others. Thus interval (1) will be between 0.01 to 1.00; interval (2) between 1.01 to 2.00; interval (3) between 2.01 to 3.00; and interval (4) between 3.01 to 4.00.

The values for each variable elicited from the households will be read-off from a standardized scale to be designed, and the appropriate weight interval assigned.

This method was dropped because it will involve more subjective judgements, since one will now have to assign weights to a total of twenty (20) sub-classes. Data entry, analysis, and interpretation will definitely be a nightmare.

THE VARIABLES AND THEIR MEASUREMENT:

Static model variables and measurements:

These would be household values elicited from the household head or a representative of the household.

1. ABILITY TO FINANCE

(A) HOUSEHOLD INCOME (Y_h) = monthly average

As stated earlier, #1,000.00 is the monthly minimum wage of public servants, and it is assumed that at least two people must be earning income for a household to have an average quality of life. Hence, the average household income should not be less than #2,000.00 for it to have the ability to finance the consumption of its basic needs.

Less than #1000.00	----	1.00
Between #1001.00 to #1999.00	----	2.00
Between #2000.00 to #3000.00	----	3.00
#3001.00 and above	----	4.00

Note: There may be seasonal variations in the income of some people especially farmers. In this case, the average of the two highest and two lowest income-earned months should be used.

(B) EXPENDITURE ON HEALTH CARE (E_m) = Monthly average

This is based on the assumption that a household spends a minimum of 10% of its income monthly on health care.

Less than #100.00	----	1.00
Between #101.00 to #199.00	----	2.00
Between #200.00 to #300.00	----	3.00
#301.00 and above	----	4.00

(C) EXPENDITURE ON FOOD (E_f)

It is based on the assumption that a household spends a minimum of 50% of its income on food monthly.

Less than #500.00	----	1.00
Between #501.00 to #999.00	----	2.00
Between #1000.00 to #1500.00	----	3.00
#1501 and above	----	4.00

(D) OWNERSHIP OF PROPERTY (O_p)

Owns no property	----	1.00
Owns personal home with zinc roof or and farmland	----	2.00
Owns personal home with zinc roof or and farmland plus television set or refrigerator or bicycle	----	3.00
Owns personal home with zinc roof or and farmland		

plus motor vehicle like car or motorcycle ----- 4.00

(E) TYPE OF SAVINGS (Ts)

No savings	-----	1.00
Saving with friends or in the home	-----	2.00
Saving with cooperative	-----	3.00
Saving with bank	-----	4.00

2. WILLINGNESS TO FINANCE

(A) LEVEL OF KNOWLEDGE ABOUT ONCHOCERCIASIS (Lk)

No knowledge	-----	1.00
Fair Knowledge	-----	2.00
Good Knowledge	-----	3.00
Excellent Knowledge	-----	4.00

(B) PRIORITY RANKING OF ONCHOCERCIASIS (Pr)

Not a priority	-----	1.00
Low priority	-----	2.00
Middle priority	-----	3.00
High priority	-----	4.00

(C) PRESENCE OF CLINICAL ONCHOCERCIASIS IN AN INDIVIDUAL OR HOUSE-HOLD MEMBER (Pc)

Not present	-----	1.00
Present in household member	-----	2.00
Present in the individual	-----	3.00
Present in both	-----	4.00

(D) RISK OF AN INDIVIDUAL OR HOUSEHOLD MEMBER CONTRACTING ONCHOCERCIASIS (Rc)

No risk	-----	1.00
Low risk	-----	2.00
Middle risk	-----	3.00
High risk	-----	4.00

(E) THE MAXIMUM AMOUNT AN INDIVIDUAL IS WILLING TO FINANCE YEARLY (Aw)

Less than #20.00	-----	1.00
Between #20.22 to #34.00	-----	2.00
Between #35.00 to #49.00	-----	3.00
#50.00 and above	-----	4.00

4.4 Design of models for the approach

In this section, the models to be used as simple operational tools will be designed.

4.4.1 General Assumptions in the design of the models

1. Ivermectin is a normal economic good and it yields utility in consumption.

2. An household's priority is to maximize its utility first before considering others.

3. The household's in the communities will reveal their true preferences, which is expected to be economically rational.

4. The choice of a particular community is not expected to change in the short-term (<5 years). Therefore, a particular model can therefore be used in a community for at least 5 years with or without modifications.

5. The cost a community should bear is only the direct cost of delivering the drug to each member of the community and it is between #20.00 to 50.00 per person yearly.

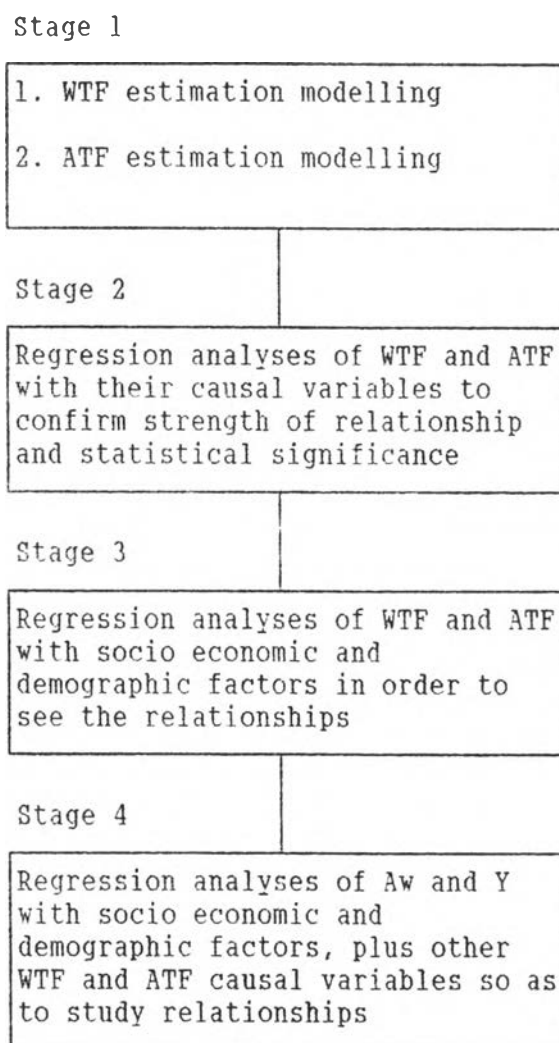
6. These assumptions are based on paretian welfare economics which accepts that the sum of all individuals willingness to pay equals society's (community's) maximum valuation for the good in question. It gives no recognition to who the recipients of benefits or welfare improvements are (Russel and others, 1995).

4.4.2 Quantitative Static Model

The steps in the design and use of this model will be presented in stages. Stage 1 will be concerned with the design, while Stages 2, 3 and 4 will be concerned with research on the possible applications of the models.

The summary of the stages are presented in figure 4.2.

FIGURE 4.2 Summary of the stages in the development of the quantitative static model



STAGE 1

Stage 1.1: Willingness to finance (WTF) estimation modelling

The aim of this section on WTF will be to develop an index of consumer choice with regards to the financing of endemic disease control. This is bearing in mind the various factors as were discussed in the previous sections, that actually determine what the rational consumer who wants to maximize utility eventually chooses. The amount of money people say they will pay or contribute will be de-emphasized but rather will be combined with other identified factors to give a more objective measure of WTF.

The necessity to adopt this method of valuation could be seen using the Diamond-Water paradox of Adam Smith (Quoted in Kaewsonthi and

Harding, 1994). In this paradox, Adam Smith noted that the price of a commodity must somehow depend on what that good offers. Yet there are cases in which a good's utility apparently has little influence on price. An example could be ivermectin which is expected to give high utility but the price to be offered by households may be low due to the factors explained in the diamond-water paradox. Therefore, the use of contingent valuation with price alone as determinant may be misleading because in this instance, health care's utility apparently has little influence on price since either the drug is been provided free of charge or its not available.

Many factors therefore should be combined with the price people say they are willing to pay or contribute in order to get a complete measurement of consumer choice. in this case to be expressed as the percentage WTF.

In the static condition, one is only concerned with the community's total utility and not marginal utility since the contributions and drug consumption is once a year. Marginal utility becomes important in the dynamic state, especially with the passage of time.

At the end, the method of calculating the actual values of WTF will be developed, thereby addressing a social scientific question on whether preferences can be adequately expressed in an utility index (Culyer, 1985). WTF is expected to answer this question by being an adequate measure of preferences or choice.

WTF as stated earlier will be derived from the utility function, thus:

Following Lavy and Quigley (1993), it is assumed that consumers derive utility from their health status, H : a numeraire good, X ; and leisure, L :

$$U = U (H, X, L) \quad (4.1)$$

This is slightly different from simple utility-maximizing model and a reasonable representation of it is a two-good world of medical services (M) and all other goods (X) subject to a simple budget constraint (Akin et al, 1985).

$$\text{maximize } U = U (M, X) \quad (4.2)$$

$$\text{subject to } pM + qX = Y \quad (4.3)$$

U = utility

M = constant quality unit of medical goods

X = a composite of all other goods

p = price of a unit of medical services

q = price of a unit of other goods

Y = individual income, which is completely exhausted by expenditures on M and X .

Continuing from 3.1, the health status of a person or household in an onchocerciasis endemic area is a function of many factors. Thus:

$$H = H (P,O) \quad (4.4)$$

P = preventive health care services

O = a composite of other types of health services

Assuming that onchocerciasis control is strictly preventive in nature, then;

$$P = P (Oc,Op) \quad (4.5)$$

Oc = onchocerciasis control

Op = other preventive services

The factors that affect the perception of households towards onchocerciasis control, and hence the utility to be derived from financing its control are multi-dimensional. These factors may stem from their level of knowledge and beliefs about the disease (Kb); their level of exposure to the disease (Le); and their perceived risk of contracting the disease (Pr). Thus:

$$Oc = O (Kb, Le, Pr) \quad (4.6)$$

These perceived health status and behavioral factors in turn determine the amount of funds a household is prepared to expend for the disease control. There is direct relationship between the amount and health status/behavioral factors. That is, as the perceived need increases, the amount of funds the households will be willing to expend will be more. This is illustrated in figure 1 in the appendix. Perceived need also increases if the level of knowledge, perceived risk, priority ranking, and presence of manifestations of the disease increase.

A household with some given perceived health need or disease can choose a type of treatment, T; and an intensity of treatment, N; by making expenditures, E. (modified from Lavy and Qigley, 1993). Thus:

$$E = E (T,N,A) \quad (4.7)$$

A = a vector of preexisting exogenous factors (for example, health capital, severity of illness, and so on).

Equation 4.7 derived from those researchers was developed by them with curative medicine in mind. However, in this research that is concerned with preventive medicine, the explanatory variables in equation 4.6 can replace those in equation 4.7 and we then have;

$$E = E (Kb,Le,Pr) \quad (4.8)$$

Rational for the replacement:

The type of care chosen by a household when viewed from the endemic disease preventive point of view, will be determined by how much the household is aware of the disease and its prevention. This is directly related to their level of knowledge and beliefs about the disease. Secondly, an intensity of treatment in the case of preventive care is approximated to the level of exposure of the households to the manifestations of the disease. Finally, a vector of pre-existing factors is a matter of households' perceived risk of contracting the disease. This is because they will weigh their health capital, severity of endemicity of the disease, etc. before deciding on the level of risk they are running of contracting the disease.

It is noted that in a competitive market, the price/expenditure function represents the envelope of consumers' bids for different combinations of treatment and money, depending upon the seriousness of illness (Lavy and Quigley, 1994). Conversely, in the control of endemic diseases like onchocerciasis, there is no competitive market and in most cases the clinical manifestations of the disease has been with the people for a long time, and are therefore not viewed as been serious in most cases. Therefore, a price function in this case may not strictly represent bids for preventive care, since such care may be absent or the people may not be aware of its existence. Such a function may even be non-existent.

Also because a joint community action is needed in most cases to control the disease effectively with ivermectin, the hedonic price relation between the qualities and attributes of medical treatment or prevention with price may be misleading. This is because of the market failures which are more evident in the control of endemic diseases because they are in most cases seen as public goods with externalities. Thus, any relationship projected based on what people profess may be misleading, because it may not represent their actual behavior due to the market failures.

Therefore, in deciding on whether an utility maximizing individual or household will make an expenditure to finance the control of onchocerciasis with ivermectin, an index of the factors revealing consumer choice should be combined such as:

$$WTF = W (E, Kb, Le, Pr) \quad (4.9)$$

While accepting that equation 4.7 is correct and KB, LE and PR explain E, one is however inclined to develop a better measure since endemic disease control is different from other health care services. This is coupled with the fact of the errors in measuring WTP in past studies where E was viewed as the sole pointer of consumer choice.

Therefore, an utility maximizing household with health care as a priority will exhibit a choice of WTF subject to budget constraints or ATF.

By substitution;

(1) let the level of knowledge and beliefs (Kb) be represented by level of knowledge about onchocerciasis (Lk) and priority ranking of the disease (Pr);

(2) let level of exposure to the disease be represented by Presence of clinical onchocerciasis in an individual or household member (Pc);

(3) let perceived risk be represented by risk of an individual or household member contracting onchocerciasis (Rc); and

(4) let expenditure be represented by the maximum amount an individual is willing to pay or contribute yearly (Aw). Therefore:

$$WTF = W (Lk, Pr, Pc, Rc, Aw) + u \quad (4.10)$$

This is a linear relationship. It should be finally expressed in percentages in order to give the level of consumer choice. Thus:

$$WTFh = W (Lk + Pr + Pc + Rc + Aw) + u \quad (4.11)$$

$$WTFc = \sum WTFh \quad (4.12)$$

$$\%WTFc = WTFc/\text{maximum WTF} * 100 \quad (4.13)$$

Where:

WTFh = WTF of a household

WTFc = WTF of a community

The mean values for the causal variables should be summed up to get the value of WTF in all cases. This can then be expressed as a percentage of the maximum possible WTF, in order to show the level of WTF of a household or community as the case may be.

Equation 4.11 can be seen as an utility function for disease control conditional upon other health factors and their prices, and other numeraire good and their prices in the market. This is because any order-preserving function can be used as an utility function (Sher and Pinola, 1986).

Furthermore, any positive transformation of an order-preserving function can equally serve as a utility function. That is to say that any function that assigns a larger number to the left of a function such as (4.11) whenever any of the independent variables on the right side increases can serve as a utility function in ordinal theory (Sher and Pinola, 1986).

Stage 1.1: Ability to finance (ATF) estimation modelling

Ability to pay must accompany the desire for a good or service before actual consumption can take place (Sher and Pinola, 1986). Also according to the authors, a consumer's ability to pay involves two things: (1) the consumer's income, and (2) the price of commodities, and hence both things must be brought into the theory of choice to complete it.

Ability to finance can be seen as the budget constraint in the households' utility maximizing decisions, and will be derived from that expression. It is also known that each consumer spends his/her income in the way that yields the greatest amount of satisfaction or utility. Thus:

$$\text{from equation 4.3 } Y = pM + qX$$

Y = individual income which is completely exhausted by expenditures on X and M . However, in this research the unit of analysis is the household and therefore Y = household income.

Household income is a function of many factors. As stated earlier, it will not be wise to consider only cash income of the households as the only budget constraint when carrying out studies in disease endemic areas most of which are in the rural areas. This is because most of the households work in the informal sector, e.g. farming and hence do not earn easily quantifiable income. Even those working in the formal wage-earning sector may also be engaged in farming, fishing, poultry, and other non-cash income yielding ventures.

Therefore an index of budgetary constraints that interplay in a household should be used to get a better understanding of utility maximization constraints. This index is to be known as ATF.

$$\text{ATF} = A (Y_h, E_h, E_f, O_p, T_s) + u \quad (4.14)$$

Y_h = Household income

E_h = Expenditure on health care

E_f = Expenditure on food

(Note: all above are monthly average values).

O_p = Ownership of property

T_s = Type of saving

ATF will also be finally expressed in percentages for similar reasons as in WTF. The mean values for the variables should be summed up to get the value of ATF in all cases. Thus:

$$\text{ATF}_h = A (Y + E_h + E_f + O_p + T_s) + u \quad (4.15)$$

$$\text{ATF}_c = \sum \text{ATF}_h \quad (4.16)$$

$$\% \text{ATF}_c = \text{ATF}_c / \text{maximum ATF} * 100 \quad (4.17)$$

Where:

ATF_h = ATF of a household

$ATFc = ATF$ of a community

Equation 4.15 will give an easy to understand level of budgetary or ability constraints on a household or community.

Relationship between ATF and WTF:

Both are directly related as illustrated in figure 2 in the appendix. It is assumed that as ATF increases, WTF increases too.

Stage 2

An OLS multiple regression analysis of ATF and WTF with their causal variables should be carried out to confirm the strength of association, observe the completeness of the data and their statistical significance. The coefficients will enable one to know which variables have more significant impact on WTF and ATF respectively. A perfect fit and highly significant statistical tests are expected if the data is complete and in order. Therefore, this test will help to cross-check the completeness of the data. The covariance and correlation analysis will show the level of relationship between the causal variables themselves.

Stage 3

OLS multiple regression analysis of ATF and WTF with socio-economic and demographic factors in order to observe their relationships. These factors were identified in section 4.2 under the heading of multitude of indicators affecting ATF and WTF.

Stage 4

This stage incorporates the approach of the classical Willingness to pay (WTP) technique. The steps are:

1. Analysis of the amount households state that they are willing to pay or contribute (A_w);

Prominence is given to A_w because; 1. It is the most objective indicator of consumer choice, and other indicators directly affect it as seen in figure 2.1 under conceptual framework; 2. Either the mean or the median A_w estimated will be used as the amount that each household should pay/contribute per eligible household member.

The first step should be to calculate the mean and or median A_w : The mean values were used by Donaldson and others (1993A), Olsen and Donaldson (1993), and by Donaldson and others (1994A). Conversely, Weaver and others (1993A) used median WTP values. One favors using the mean in this study since the range of possible A_w is narrow because of

the measurement technique adopted. Therefore, very wide variations as to necessitate the use of the median values is not anticipated. However, if time is no problem, both of them could be computed and the value compared.

The next step is an OLS- multiple regression of A_w with relevant socio-economic and demographic factors plus its fellow WTP causal variables: OLS-multiple regression analysis was used by Olsen and Donaldson (1993) in studying WTP. Note that the actual amount people stated should be used for the regression and not the interval scale weights.

As was postulated by Weaver and others (1993B), regression will be estimated to assess the validity and reliability of the responses to the contingent valuation questions. According to the same authors, validity in this context is the extent to which the responses to the contingent valuation questions measure A_w . Reliability in the same vein, is the extent to which the responses reflect true preferences rather than random responses.

Logistic regressions as was applied by Weaver and others (1993A), Lavy and Quigley (1993), and by Donaldson and others (1994A), could be used also, but it would only make data analysis to be more complex.

Tobit analysis could also be used in WTP studies. (Donaldson and others, 1994B). According to these authors, tobit analysis was developed by Tobin, for use in situations in which the dependent variable has a number of values clustered around a limiting value, usually zero. The technique is a hybrid of OLS and Probit models.

According to Halstead and others (1991) and quoted by Donaldson and others (1994B), the tobit technique is the more theoretically correct method for WTP data sets with larger numbers of zero values. However, according to these authors, as analysis of WTP data in health-care is still in its relative infancy, OLS-Tobit comparisons are worthwhile. Nonetheless, one feels that tobit analysis is not necessary in this case since zero values are not expected due to the scale of measurement adopted.

2. Analysis of household income: Income is given prominence because it is the most objective determinant of ability. Similar analysis as was done for A_w should be applied here. The aim being to study the relationship of stated income with other variables, so as to confirm the validity and reliability of the valuation.

One should be careful in interpreting tests of statistical significance in all these analyses. This is because statistically insignificant variables may not really be insignificant. Kalbfleisch and Sprott (Quoted in Maddala, 1989) argue that it is a gross simplification to regard a test of significance as a decision rule for accepting or rejecting a hypothesis. They argue that such decisions are

made on more than just experimental evidence.

Thus the purpose of a significance test is just to quantify the strength of evidence in the data against a hypothesis expressed in a (0,1) scale, not to suggest an accept-reject rule (Maddala, 1989). Therefore, when the tests deviate from what is logically reasonable, the decision maker should decide on what steps to follow.

4.4.3 Quantitative Dynamic Model

In a dynamic state, it is important to postulate on how fast or slow the marginal utility of the households in the community will decline.

Marginal utility is the fulcrum of the cardinal utility theory, which is noted has been replaced by ordinal utility theory in the theory of consumer behavior since World War 2 (Sher and Pinola, 1986). Cardinal utility as stated by the authors is not wrong in logic, only that it has stringent assumptions that support it therefore making the theory unrealistic.

However, the theory is very relevant in the analysis of WTF in a dynamic condition, since moreover, ordinal utility assumes the absence of externalities (Sher and Pinola, 1986). Externalities are part and parcel of endemic disease control activities.

Marginal utility is an intrinsic part of Marshall's demand theorem, and it can be applied only for goods on which expenditure constitutes a very small portion of the individual budget (Culyer, 1985). Yearly contribution or payment for ivermectin procurement is expected to be like this.

If the decline in marginal utility is slow, then a consequent community financing scheme can be sustained over along period and vice versa. In this vein, the Law of Diminishing marginal utility may not strictly apply to the WTF onchocerciasis control with ivermectin, for maybe the initial ten to fifteen years of implementing a community financing scheme.

This is because marginal utility is expected to increase or remain in status quo once the community gets the drugs promptly, the management of the scheme successful, and the morbidity from the disease declining. Total and Marginal Utility are defined in terms of the consumer's willingness to part with money for the commodity (Culyer, 1985).

Since what is involved is once yearly contributions or payments for the private excludable consumption and benefits from ivermectin, the marginal utility is expected to start declining very slowly after many years of its having rapid increase.

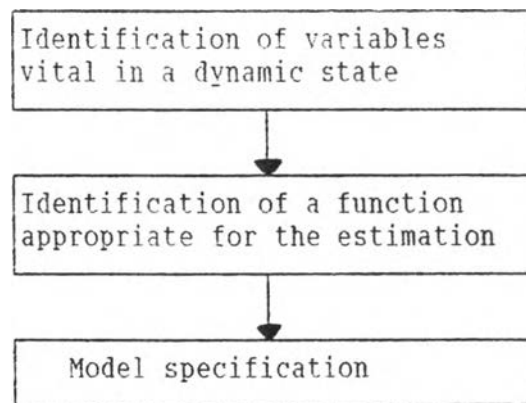
The major factors that will affect the state of utility and

marginal utility in a dynamic condition will things like the level of education, success rate of the community financing scheme, and the amount the people will be willing to finance with. Figure 3 in the appendix illustrates the relationship between utility and WTF.

The static model developed in the last section can be treated as a dynamic model, if consideration is given to changes in parameters and the interdependence among variables. This is in the line of thought as stated by Kaewsonthi (1989) in describing the pool of infection model.

The stages in the development of the quantitative models are illustrated in figure 4.3 below.

FIGURE 4.3 Stages in the development of the quantitative dynamic model



Thus in the specification of the dynamic model :

1. Willingness to finance

The dynamic WTF is derived from the WTF static function. Logit function is used to estimate WTF in dynamic condition, and the scores are expressed in terms of 0 or 1. Score of 0 means that WTF of a household or community is not enough to support a community financing scheme, and the converse is true for score of 1. Thus modified from the quantitative static model:

$$WTF^d = a_0 + a_1Lk + a_2PC + a_3Pr + a_4RC + a_5AW + u \quad (4.18)$$

The interdependence of these causal variables should be considered, together with long-term effects. Also, variables that will affect WTF in dynamic conditions are considered. Such a variable is the success rate (Sr) of the community financing scheme. One of the best-documented and least understood phenomena in health economics is the independent, positive effect of education on health status and life

expectancy (Cochrane and others, 1980: Quoted in Akin and others, 1985).

One however feels that as the level of education of or new information acquired by the people changes, their perceptions and level of knowledge about endemic diseases onchocerciasis will increase, and they will perceive the disease as a threat rather than something to live with. Also their negative beliefs or culturally derived values will be erased. This invariably will affect their WTF which is expected to increase.

In a related matter, a study noted that in Brazil, India, and Nigeria, better educated households are willing to pay 6 to 50% more than other households for improved water supplies (World Development Report, 1993).

Thus:

$$Aw^* = F(Lk, Pc, Pr, Rc, Sr) \quad (4.19)$$

Sr = success rate of the community financing scheme

$$Lk = L(Le) \quad (4.20)$$

Le = level of education

$$Pr = R(Lk) \quad (4.21)$$

Thus in dynamic conditions, the important variables that will determine WTF will be Aw, Sr, Le and WTF of the previous year.

Therefore by substitution;

$$WTF^* = a_0 + a_1Aw + a_2Sr + a_3Le + a_4WTF_{t-1} + u \quad (4.22)$$

$WTF = 1$ if $WTF^* > 0$, and 0 if otherwise

Projections should be made about SR and LE, and equation 4.22 should be estimated as a LOGIT function.

2. Ability to finance

Its derivation is also from its static counterpart. Logit function like in WTF is also used, and the significance of the scores and coefficients are also similar.

$$ATF^* = a_0 + a_1Yh + a_2Eh + a_3Ef + a_4Op + a_5Ts + u \quad (4.23)$$

$$Yh = f(Tc, Ep, NNP) \quad (4.24)$$

Tc = type of occupation

E_p = type of employment
 NNP = national income

Special emphasis is paid to income because it is assumed to be completely exhausted by expenditure on X and M (recall equation 4.3). Therefore, factors that affect income in the dynamic state should be studied. Income increases if someone's type of occupation is good and the person is gainfully employed. households' income also increases as the national income increases.

Since it is assumed that a household spends all of its disposable income and hence savings is regarded as expenditure too. Thus:

$$Y_h = E_h + E_f + O_p + T_s + X \quad (4.25)$$

By substitution the specification of the dynamic ATF model:

$$ATF^t = a_0 + a_1 Y_h + a_2 ATF_{t-1} + u \quad (4.26)$$

$ATF = 1$ if $ATF^t > 0$, and 0 if otherwise

ATF_{t-1} = ATF of the previous year

When the income changes, the budget line shifts and the consumer moves to a new equilibrium (Sher and Pinola, 1986). The Engel curve which shows the relationship between income and the corresponding quantity of a commodity that a consumer consumes at equilibrium, for given prices and preferences of the consumer is expected to be positively sloped for ivermectin since it is a normal good. The Engel curve of a household or community could be traced to see how ATF changes as Income and Consumption changes. This is with price of ivermectin and WTF being constant.

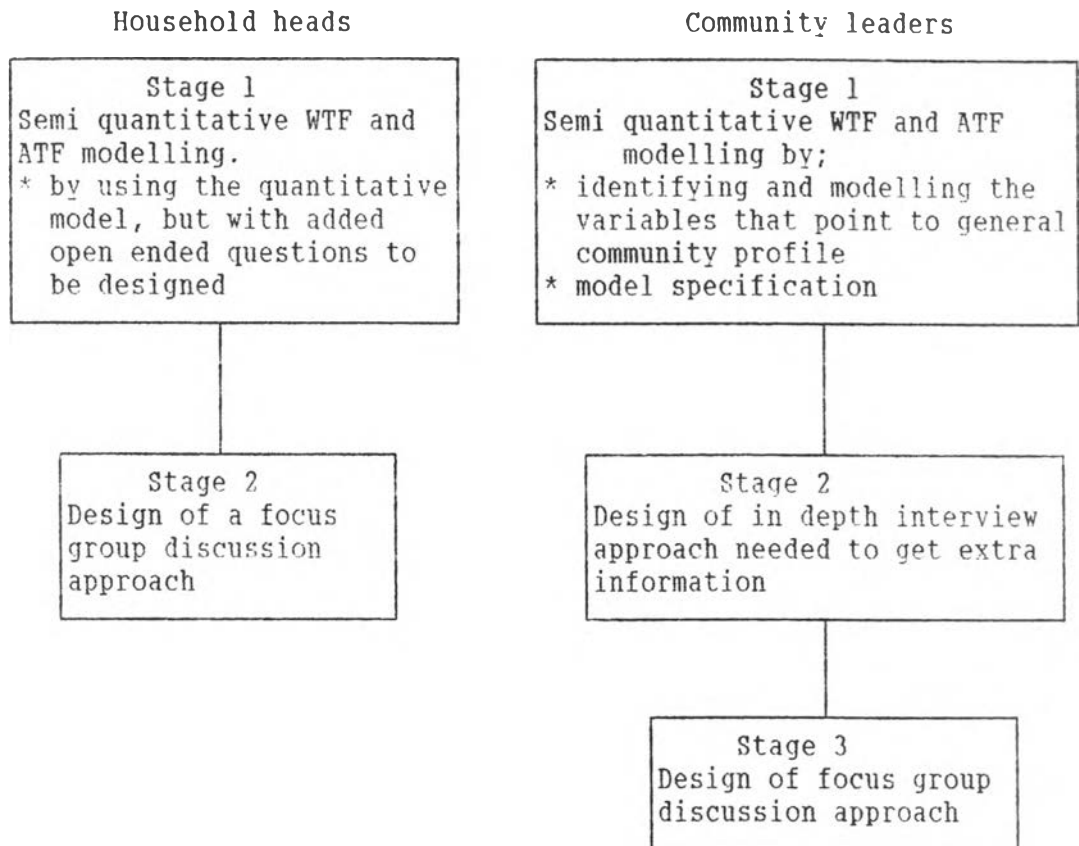
4.4.4 The Semi-Quantitative Model

Following the example of Hongvivatana and Manopimoke (1991) in their study of the preference for rural health insurance in Thailand, this model will be used to get information from household heads and community leaders. However unlike in the study mentioned above, government administrators as providers will not be studied. It is nevertheless important to consult with them before implementing any community financing scheme.

It should be pointed out, that only the semi-quantitative ATF and WTF valuation using the semi-structured questionnaires will be used to determine their levels in the community. In-depth interviews and focus group discussions will serve to clarify some important issues raised in the ATF and WTF valuation, and also to iron out areas of controversy. Very importantly, they will serve as vehicles for elucidating the nature of the community financing scheme that will be appropriate for the community.

The stages in the development of the semi-quantitative model are presented in figure 4.4 below.

FIGURE 4.4 Stages in the development of the semi-quantitative model



1. Household heads

Stage 1 : SEMI-QUANTITATIVE ATF & WTF DETERMINATION

The same equations that were used in the stages of the quantitative static model will be used. It will also serve as re-test comparison for the quantitative model. That is, the same set of people earlier studied with the quantitative model will again be used here, and their answers analyzed by using similar techniques utilized in all the stages of the quantitative model to see whether they have changed. If their answers are still similar, then one is reassured that the people are revealing their true preferences and ability. Whereas if they have changed, then either the people are hiding their preferences and or ability, or some factors have made them to change their choices and answers.

Open ended questions about the peoples' preferences will be asked after they have given answers to each question.

The same scale of measurement as used in the quantitative model will be used in this case too.

Stage 2: FOCUS GROUP DISCUSSIONS

This will be conducted with some selected household heads to get a consensus opinion. It will also help to see how the relationship of the households in the community affects their WTF. Two different groups of discussants comprising of males and females respectively will be used, so that no group will have influence over the other's views. Women are recognized as both the traditional health care providers and the primary implementers of health policies in their homes. Their views must be sought without interference from their husbands or male community members.

Many of the questions in the questionnaires used in the ATF and WTF studies will be further analyzed in these discussions. The use is to further strengthen or weaken the findings in the quantitative and semi-quantitative studies, and to illuminate all the vital points necessary for implementing a successful community financing scheme. Also, discussions on the type of scheme appropriate for them, and the modus operandi for the scheme.

2. Community leaders

Stage 1: SEMI-QUANTITATIVE ATF AND WTF DETERMINATION

Variables that will be included are factors that point to the general community's ability and willingness to finance disease control. Therefore, it will entail collecting information about the community's profile with semi-structured questionnaires. As was the case with household heads, open ended questions will be asked after each answer.

The causal variables for ATF and WTF will be derived from the ATF and WTF functions in the quantitative model. However, they will be modified to reflect the idea of assessing the community as the unit of analysis instead of the households in the community.

ATF_c causal variables:

1. Level of income of the community's households (Y_c)
2. Property ownership of the community's households (O_p)
3. Existence of community self-help projects (E_p)
4. Existence of community funds (E_f)

$$ATF_c = A(Y_c + O_p + E_p + E_f) + u \quad (4.27)$$

ATF_c = ATF of the community from the general profile elucidated from the community leaders. It will also be finally expressed as a percentage of the maximum possible ATF, using the same technique that was used in the quantitative static model.

Rational for choosing the above causal variables for ATP.

Yc and Op:

They involve value judgement by the community leaders about their community. However, they are important factors to elucidate because the information gathered will serve to confirm or contradict the one received from household heads. If both sources of information give similar answers, then one is confident that both parties are telling the truth. Conversely, if there are major contradictions in information received, the researcher must clarify the reasons for the conflicting views, and this can be done using both in-depth personal interviews and focus group discussions.

Ep and Ef:

A community that has some self-help projects and or funds, obviously can be seen as having the ability to finance the provision of some basic goods and services. The opposite is not necessarily the case, because some communities may have the ability but lack the structural cohesiveness to implement such projects or funds. However, in this approach it is assumed that a community that has self-help project(s) or fund(s) is able and those without such activities lack the ability to finance the provision of communal basic goods and services.

Factor affecting WTF_c :

1. Level of knowledge of the community. (Lk)
2. Priority ranking of the disease (Pr)
3. Amount willing to contribute (Aw)

$$WTF_c = W(Lk + Pr + Aw) + u \quad (4.30)$$

WTF_c = WTF of the community from the general profile elucidated from the community leaders, and it is finally expressed as a percentage of the maximum possible WTF using the technique illustrated in the quantitative static model.

Rationale for choosing the above causal variables for WTF.

The rationale is similar to those in the case of household heads in the quantitative model and in this semi-quantitative model. But since community leaders are going to judge the level of knowledge of their households, only the leaders with some knowledge about onchocerciasis will be used. Therefore, during the analysis answers from the leaders with no knowledge will be discarded.

Scale of measurement for the variables

The same interval scale used in earlier stages will also be applied here.

Stage 2: IN-DEPTH INTERVIEWS WITH SELECTED COMMUNITY LEADERS

These leaders include traditional rulers, religious leaders, politicians, women and age group leaders.

The interviews will be through personal interviews using standard questions to be designed. The answers will be coded according to a standard format for subsequent analysis.

There will be two questions each for ATF, WTF, and Community financing respectively.

Stage 3: FOCUS GROUP DISCUSSIONS

This will be done with 2 different groups of community leaders. One group will have only males and the other only females. This is to avoid undue influence by one gender on the other's opinion.

4.5 The Study tools

Introduction

How the study tools are structured will determine the quality of information to be captured. This approach being designed involves sensitive issues like matters concerning a household's ability like income, consumption and wealth, and these are very difficult information to get due to variety of reasons like tax evasion, concealing poverty or riches e.t.c. The approach also involves issues that deal with value judgements like the matter of WTF. Therefore, a very careful design of the tools need to be undertaken for the approach to be useful and to gather all the vital elements needed for the valuation from the community members.

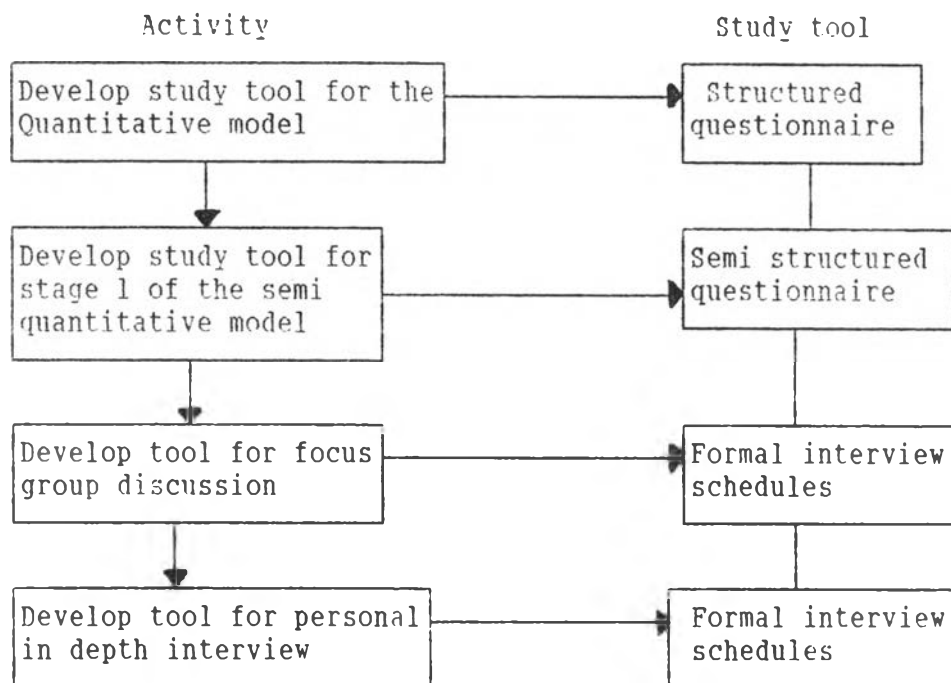
Hence, multiple questions may need to be asked in order to get the full information about a variable. The questions must be asked in an unobtrusive manner, so that the community members will be gently coerced into revealing all the information needed from them. If the questions are too direct or obtrusive, the individuals may feel threatened and then will clam-up without giving any useful information.

After the series of questions about a variable, the answers will be coded so as to fit into the measurement scale designed. Methods for doing this coding will be discussed after the section on each group of questions below.

For the purpose of a field study, the coding of the answers should be done by the chief researcher after the interviews has been conducted. The people conducting the interviews should not know the coding system so that it does not bias their recordings. This is a type of double blind study where both the interviewer and the interviewee do not know the likely result of the answers.

Explanations will be given to clarify some questions used in elucidating some variables, while other questions that are self-explanatory from the descriptions given earlier under quantitative model will not have such explanations.

FIGURE 4.5 The stages in developing the study tools



1. Structured Questionnaire for the Quantitative Model

It will consist of the following sections:-

Introduction

It will contain some information about the purpose of the study, and some background information on onchocerciasis and ivermectin. This is to enable the people to have an idea of what is in stock for them. It will also serve to erase any fears or inhibitions they may have about participating in the study. It is illustrated in the appendix where the questionnaire is presented.

Biodata of interviewee

Ability to finance:

INCOME

The factors controlling it are multi-factorial. It can be cash

or non-cash income but all must be measured for reasons given earlier. A sequence of ten questions is used, and the market price shall be used in valuing non-cash income.

1. Do you earn cash income monthly? (yes or no)
2. If yes, how much do you earn monthly?
3. How many other people in your household earn cash-income?
4. What is the combined amount they earn per month?
5. Do you earn non-cash income?
6. If yes, what is the approximate average monthly value in monetary terms for this non-cash income?
7. If you do not earn monthly, what is the average amount that you earn yearly?
8. How many other people in your household earn non-cash income ?
9. If there are, what is the approximate average monthly value in monetary terms for this non-cash income?
10. If they do not earn monthly, what is the average amount that they earn yearly

Total household income = Sum of both cash and the monetized value of non-cash income of the household members.

EXPENDITURE ON HEALTH CARE SERVICES:

Instead of jumping directly and asking the households how much they spend on health-care, an approach of first establishing the use of health care services is used. This approach should get the people thinking and thereafter be able to estimate their expenditure correctly. It will also help the researcher to link expenditure to service use.

The total cost of health care will be the cost of health care services and transportation for the patient if any. These are the two most important cost items, and so the others like cost of food, accompanying relatives, opportunity cost though important will not be considered in order to make this approach both practical and manageable.

It is recognized that the question on amount paid for the treatment of manifestations of onchocerciasis, will be included in the earlier question on how much the patients spend on health care quarterly. However, it will be worthy to note how much they are presently spending on onchocerciasis control. In utility trade-off analysis this amount can be assumed as what they may be willing to pay, but this method is not being considered in this research due to the drawbacks discussed earlier.

According to WASH (Quoted in Russel and others, 1994), these questions will establish the credibility of the subject matter, and stimulate the respondent into considering what they are currently willing to pay for particular health services and why.

Three months rather than a month are used so as to capture more expenditures, because the occurrence of ill-health may not be on a monthly basis within households.

1. How often do you or members of your household visit health care facilities in a year? These facilities? These include drugstores, clinic, traditional doctors and herbalists, homeopaths, spiritual leaders, hospitals etc.

Rarely = 0
Once in a while = 1
Regularly = 2

2. Did you or any member of your household visit or buy drugs from any of the above mentioned health facilities within the past 3 months?

Yes
No

3. If yes, how much did you spend on health care on the whole?

4. How much did you spend on transport?

5. How much on the average does your household spend on health care yearly?

6. Have you or anyone in your household ever gone for the treatment of any of any of the following diseases:-

a. itching on the skin
b. nodule removal
c. hanging groin
d. hydrocele
e. more than one
f. none of the above

7. How much did you pay for treatment?

Total expenditure = expenditure on health care + transport fare

Average monthly expenditure = total expenditure / 3

EXPENDITURE ON FOOD

It is important to monetize the value of home produced food items, as done in question 2.

1. How much does your household spend to buy food from the market monthly?

2. if you produce some of the food items that you consume in your household, how much do you think they are worth monthly?

AVERAGE MONTHLY FOOD EXPENDITURE =

OWNERSHIP OF PROPERTY

1. Which one of the following do you own.

a. Personal home with zinc/asbestos roof and or farming land
b. Option A above plus television set or refrigerator or bicycle.
c. Option A above plus motor vehicle like car, motorcycle etc.
d. Owns nothing

TYPE OF SAVINGS

How do you save your money?

- a. Saving with friends or in the house.
- b. Saving with cooperative
- c. Saving with bank
- d. No saving

Willingness to finance:

LEVEL OF KNOWLEDGE ABOUT ONCHOCERCIASIS

This is the key to unravel factors relating to the willingness of a household. A household will find it difficult to contribute to something they are ignorant of the expected utility or benefit they will gain and vice versa. This assumption is the general case but it is not the rule.

No question is asked directly about onchocerciasis because the people may not recognize the terminology. Rather, the disease spectrum caused by it are used. These, the people will know about. It will be necessary to translate the symptoms to the local terminologies before conducting a survey.

The questions are structured in a way that will gently prod the interviewees to reveal what he/she knows. No specific question was asked about ivermectin because not many people are expected to know about it. However, if the study is being conducted in a community that has been exposed to the drug, then questions regarding to the knowledge about it should be included. The answers are scored according to the code illustrated below.

1. Which of the following diseases have you heard about that occurs in your community?
 - a. Onchodermatitis (itching)
 - b. Nodules
 - c. Leopard skin
 - d. Hanging groin/hydrocele
 - e. Blindness

2. If you recognize one or more diseases, then what is the cause?
 - a. Bad air
 - b. Witchcraft
 - c. Bite from blackfly causing onchocerciasis
 - d. From food
 - e. Do not know

3. If the cause is known, what is the treatment or preventive measure

for the disease?

- a. Medicine and or surgery
- b. Spiritual healing means (it could be through Christian/Muslim/traditional religious means.
- c. Kill blackfly
- d. Do nothing
- e. Do not know

Criteria for scoring:

a. knowledge of at least two symptoms of the disease and link with blackfly plus the use of medicine & surgery or killing blackflies implies high degree of knowledge. Score = 4.00

b. Knowledge of one symptom and link with blackfly plus the use of medicine for disease management means middle knowledge. Score = 3.00

c. Knowledge of one symptom and link with the blackfly or the use of medicine or surgery for management means low knowledge. Score = 2.00

d. Knowledge below (C) above Score = 1.00

PRIORITY RANKING OF ONCHOCERCIASIS

The people are not asked to list their priority problems, and then for the researcher to see whether onchocerciasis is one of them as done in qualitative studies. Rather, they are asked to rank the disease by grading, so that the result can be analyzed quantitatively.

Do you consider onchocerciasis which causes all the diseases mentioned above a problem in your community.

- a. No
- b. Little problem
- c. Big problem
- d. Very big problem

PRESENCE OF CLINICAL ONCHOCERCIASIS IN AN INDIVIDUAL OR HOUSEHOLD MEMBER.

Do you or any member of your household suffer from any of the diseases caused by onchocerciasis that were mentioned above?

- a. No
- b. Present in a household member
- c. Present in self
- d. Present in both household member and self.

RISK OF AN INDIVIDUAL OR HOUSEHOLD MEMBER CONTRACTING ONCHOCERCIASIS

Do you feel that either you or any person in your household stands the risk of getting onchocerciasis?

1. No risk
2. Low risk
3. Medium risk
4. High risk

THE MAXIMUM AMOUNT AN INDIVIDUAL IS WILLING TO PAY OR CONTRIBUTE

This is the crux of the matter and the most sensitive issue to be explored. Therefore, a series of questions are used. The first two questions establish the availability of a drug for the disease and the nature of the cost that the community is expected to bear. They are intended to be used in gaining the confidence of the interviewee so that he/she will open-up.

The next two questions (3.4.) tells the interviewee that taxation is not the issue, but that the community has an option of managing the funds. This now leads to the question of A_w and the options.

A bidding game could be used to elicit A_w . The mechanism of the bidding game has more market realism than earlier one-shot open-ended questions about the maximum a person would pay (O'Brien and Viramontes, 1993). Bidding games have the advantage of initiating a process of thought and choice about different prices (Russel and others, 1994). However, according to these authors, there is a danger that this starting value or point can bias responses. A solution should be a card technique which "scatters a range of cards on the table" to help the respondent visually but which presents them all options at once, avoiding starting point bias (Mitchell and Carson, 1986; quoted in Russel and others, 1994). Nonetheless, in a study by O'Brien and Viramontes (1993), it was noted that there was no evidence of starting point bias.

It should be understood that only the answer to question 6 will be used in the analysis. The other questions are supportive in that they are used to both gain the confidence of the people and to present to them what they are being asked to value, together with the options available to them.

The question number five is to examine whether equity in drug distribution will be adopted by the community.

1. If there is a drug that can effectively prevent and also cure some of the diseases caused by onchocerciasis, will you be prepared to be prepared to pay for such a drug for yourself and your household?

Yes or No

2. A drug called ivermectin is very effective in controlling onchocerciasis. It is also provided free by the government. What is needed is the cost of bringing and distributing it to all eligible community members. Are you willing to contribute for its procurement?

Yes or No

3. Assuming a community fund is set up for the sole reason of financing the procurement of ivermectin, how would like the fund to be managed?

1. Collected and managed by the community with government supervision.
2. Collected and managed by the government with community supervision.
3. Collected by the government but managed by the community.
4. Collected by the community but managed by the government.

4. What type of payment scheme do you prefer?

1. Fee-for-service
2. Pre-payment

5. Do you feel that those unable to pay like the handicapped etc should also benefit from the scheme?

Yes or No

6. What is the maximum amount that you will be prepared to pay or contribute yearly since the drug must be taken at least once yearly for some years in order to eradicate the disease from your community

1. less than #20.00
2. Between #20.00 to #34.00
3. Between #35.00 to #49.00
4. #50.00 and above

7. Will you pay for the other eligible members of your household?

Yes or No

Semi-Quantitative Model's study tools

1. Household heads

SEMI-STRUCTURED QUESTIONNAIRE

The same questionnaire that was used in the quantitative study will be used here also. Additionally, open ended questions will be asked after each question in order to get to the heart of the logic behind consumers' choice.

2. COMMUNITY LEADERS

Stage 1: SEMI-STRUCTURED QUESTIONNAIRE

ABILITY TO FINANCE:**1. Level of income of community households**

In your view, how will you generally rate your community members in terms of their yearly income?

1. low
2. medium
3. high
4. very high

What is/are your reason(s) for your answer

2. Level of ownership of property by community members.

On the whole, how do you rate your community members in terms of the type of property they own?

1. Most do not own any of the below alternatives
2. Most own farmland and or house with zinc/asbestos roof
3. Most own 1 above plus TV, Fridge, or Bicycle
4. Most own 1 above plus motor vehicle like car or motorcycle

3. Existence of community self-help projects.

Has your community ever undertaken any self-help project like building a school, health center, market, church/mosque, town hall etc?

1. Never
2. Has undertaken at least one of the above on a small scale.
3. Has undertaken at least one of the above on a medium scale.
4. Has undertaken at least one of the above on a large scale.

4. Existence of community funds.

What are the nature of communal funds that are present in your community?

1. None has ever existed
2. Had some previous funds that were unsuccessful
3. Have one/some now that is not doing well or previous one that did well.
4. Have one/some funds that are doing well.

Questions 3 and 4 need to be explored because as Abel-Smith and Dua (1988) noted, it might be worth remembering that a community's disappointment with previous schemes also often acts as a deterrent to joining or contributing towards new schemes.

WILLINGNESS TO FINANCE:**1. Level of knowledge**

The same method that was used for the quantitative study will also be used here. The only addition is that there will be open ended questions after each answer. The aim is to establish that the community leaders themselves have some knowledge about the disease, before they are asked to rate the level of knowledge of their community members.

2. Priority ranking of the disease

How do the community members view the problem of onchocercal disease in your community?

1. Not a problem
2. A minor problem
3. A medium scale problem
4. A large scale problem

3. Amount willing to contribute

In your opinion, what is the amount of money that community households should/can contribute per eligible person for the drug procurement yearly?

1. less than #20.00
2. between #20.00 to #34.00
3. between #35.00 to #49.00
4. #50.00 and above

Stage 2: FOCUS GROUP DISCUSSIONS

They will address the questions in stage 2. Separate groups of male and female community leaders will be used for the discussions.

STAGE 3: IN-DEPTH INTERVIEWS WITH SELECTED COMMUNITY LEADERS

These questions are intended to deeply explore all ATF and WTF issues in the community. Also, the type of community financing scheme to be adopted and its mode of operation will be explored. The questions below are self-explanatory.

ABILITY

1. Please describe the sources of income of your community members. Is there seasonality in income. Do you think that they have enough income to support the ivermectin programme. yes or no

2. How wealthy are the community members. Will the community be prepared to accept non-cash payment? Do you feel that the wealth of

your community is enough to support the programme. yes or no.

3. How did you raise funds for previous successful community projects? Do you feel that the same methods can be used to raise funds for the ivermectin programme. yes or no

WILLINGNESS

1. What are the priority health problems in this community. Is onchocerciasis one of them? yes or no.

2. Will your community be ready to bear the cost of procuring ivermectin which can control onchocerciasis? The drug is free of charge and what is needed is procurement funds. And if yes, do you think that the community households can afford between #20.00 to #50.00 yearly per eligible person? yes or no

3. Will they be more willing if the funds are managed by a committee comprising of community members rather than the government? yes or no.

COMMUNITY FINANCING

1. If the community will support the programme, what sort of payment scheme should be adopted.

1. Fee-for-service
2. Prepayment

2. How would you like the funds to be collected and managed?

1. Collection and management by government with community supervision
2. Collection by government and management by the community
3. Collection by community and management by the government
4. Collection and management by community with government supervision

3. Would the community accept instalmental payment? yes or no

4. Should those confirmed to be unable to pay benefit? yes or no.