

Advantages and shortcomings of eliciting people's willingness to pay using mixed techniques: evidence from a study of Olyset bednets in three village settings in north-eastern Tanzania

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Abstract

Introduction: Agencies aiming to subsidize insecticide-treated nets (ITNs) in poverty stricken and at risk communities face a critical question about desirable price to fix per ITN without crowding-out the market of commercialized nets. Willingness to pay (WTP) studies help in establishing evidence on consumers' preferences to various products marketed.

Objective: To describe the advantages and shortcomings of a study that employed different techniques to elicit community WTP for Olyset bednets in three villages in north-east Tanzania

Methodology: Questionnaires comprising closed-ended and open-ended questions were applied, targeting adult members of households and bednet retailers. Also, focus group discussions (FGDs) with household members were held.

Results: Different elicitation techniques suggested different prices per Olyset net depending on the way the questions were applied and characteristics of study participants and conditions in which they were found. While it may seem a limitation to apply different techniques and coming up with different answers regarding the suggested optimal price of a product, we learn that consumers often value same product differently due to either their different: perceptions on it or information obtained from the market or their ability to pay. The stated WTP price per an Olyset bednet partly depended on the existing price of polyester nets quoted in the retail outlets which ranged between shillings 2500 and 4,500 while that quoted/fixed for the Olyset net under study was shillings 3,500. Olyset nets were preferred to polyester ones due to their long-lasting polyethylene fabric material, blue colour and insecticide treated in them. Paying by instalment for Olyset nets was more preferred to paying a full price at once.

Conclusion: Olyset nets have potential to attract many people if marketed carefully with reasonable prices informed by research and made physically accessed, especially in the market already dominated by polyester nets.

Key words: Insecticide-treated nets, willingness to pay, malaria, poverty, Tanzania

Background and Rationale

Insecticide-treated nets/bednets (ITNs), especially of long lasting nature, are advocated to be promoted because of their potential for protecting human beings against mosquito bites causing malaria [1]. Their benefit to individual users at household level and to the health sector or society as a whole has been verified by various large-scale bednet intervention programmes in malaria endemic countries of sub-Saharan Africa (SSA) [2-3]. Malaria reduces income opportunities and perpetuates poverty due to frequent

illnesses, outpatient and inpatient attendances at health facilities and sometimes eventual deaths: each of these events causes enormous cost to patients and their families [4-6].

Utilization of ITNs in most rural Tanzanian community settings is low [7-8], as it is in countries of SSA in general [4]. Ownership of ITNs in Tanzania was estimated to be as low as 37% of all households, with variations between areas. For example, estimates made by the National Malaria Control Programme (NMCP) in 2003 indicated that in urban areas of Dar es Salaam and Tanga regions the household net

ownership was 76% and 19% of all households respectively. In rural areas net ownership was estimated at 10-20% of all households. Due to this low net ownership and usage, the government joined other countries in SSA to set a goal of achieving 60% coverage of all children and pregnant women by 2005 in line with the Abuja Declaration [9]. One of the steps taken by the Tanzania government is the introduction of a national discount voucher scheme for assisting pregnant women and children under five years access subsidized ITNs through maternal and child health clinics [10].

Setting a high target for net coverage at country and regional levels sounds promising, but it is widely evident that affordability of ITNs is a problem everywhere in SSA [4]. This is a challenge since in some settings ITNs are less accepted because they are ranked very lowly in priority compared to other household needs [11]. While recognizing these challenges, governments in malaria endemic countries and other agencies have critically thinking and debating about the possibility of establishing delivery mechanisms for ITNs at subsidized prices without compromising the existing commercial dealers in such items [12-13]. The sustainability of the demonstrated success in increasing net coverage through large-scale bednet trials in some countries is not guaranteed, and experts view that this should be worked out, considering situations when humanitarian financial assistance particularly from donors is no longer available [14]. Since out of pocket payment is usually the most critical issue, some researchers based on their previous field experiments have suggested mechanisms of payments other than cash on delivery especially rural settings. However, observers argue that this requires more systematic research [15].

Advice is often given for those already using the nets that have not been treated at factory

level to treat their nets using appropriate insecticides. Experience shows that treating or retreating polyester type of bednets has been effectively demonstrated in mass intervention at community level rather than leaving individual households to do it on their own at their own times. This is because compliance with re-treatment and its sustainability are partly lowered by low household ability to pay (ATP) for the insecticide sachets even at subsidised prices. Therefore, long-lasting ITNs (LLINs) especially of Olyset type are evidently efficacious in prevention of mosquito bites to humans and have potential to minimize the cost of frequent re-treatment of nets [16-18]. In Tanzania these nets have been distributed for the first time between 1994 and 1995 and are one of the two LLINs as currently recommended by the World Health Organization (WHO) [16, 18].

The concept of WTP in health products including ITNs has gained increased attention among researchers in recent years [19], although the concept of WTP in the field of economics has long history since it is a key element on the analysis of demand for goods or services [20-21]. According to Consumer Behaviour Theory, individuals e.g. households, may express their WTP based on the price(s) quoted for particular products and their tastes or preferences, among other determinants of demand [22-23]. The present paper intends to inform its readers about the advantages and shortcomings of using different techniques to elicit community WTP for Olyset type of bednets based on a study undertaken in three rural villages in north-eastern Tanzania. It begins with a brief background of the theories or scientific arguments for and against adoption of a mixture of 'open-ended' and 'closed' questions, with- or without follow up to confirm the stated WTP and use of 'bidding game' technique. Specifically, the study assessed the: situation on sources of acquisition and level of utilization of bednets at household level;

household utilization of other malaria preventive materials; knowledge and attitudes towards ITNs among the study population; community views on payment mechanisms for ITNs; and household perceived and actual WTP for Olyset bednets.

Rationale for adoption of different WTP study techniques

Usually done through contingent valuation (CV) techniques, WTP is defined as the maximum income an individual is willing to give up in order to obtain a product. However, economics experts have warned that WTP elicited through CV techniques may not represent WTP in actual sense [24-30]. A comprehensive review of various methods used in the elicitation of WTP in CV using questions of different formats has been made whereby the weaknesses and strengths of each method were identified [24-30]. The methods widely discussed and suggested in literature include use of *open-ended* questions, closed *binary* (dichotomous) and closed *polychotomous* questions either with- or without- follow-up), *bidding game*, *card*, and *binary-with-follow-up* (BWFU) techniques. Out of all these, it is recommended to use the technique that can best measure one's true WTP. While the BWFU and the 'bidding game' techniques are the mostly recommended measures [30], experts recommend studies which compare both types of techniques with the real money transactions [26].

Materials and Methods

Study Areas and Populations

The study was conducted in two neighbouring districts in Tanga region, along the coast of the Indian Ocean in north-eastern Tanzania and it involved three villages namely: *Mkanyageni* in Muheza district and *Mazinde* and *Mgombezi* villages in Korogwe district. All the villages were located in rural settings and have been

selected in consideration that they were relatively at less advantage of being exposed to information and markets concerning ITNs than their urban counterparts. As described in the subsequent sections, the number of the Olyset nets that was available for the study was small to allow only three villages to be covered. Therefore it was decided to include two villages from Korogwe and only one from Muheza. The villages were identified because no similar studies had ever been carried out in those areas previously. The two districts had quite similar geographical, epidemiological (including malaria) and socioeconomic characteristics. As described elsewhere [31-33] the majority of the residents in both districts are small-scale farmers living in high poverty stricken conditions and exposed to malaria infections. Most of the village houses are roofed with dried coconut tree leaves, have muddy walls and floors. By the time of initiating the present study, there was no reliable official statistics regarding ownership and utilization rates of ITN in both districts.

Study Design and Sampling Approaches

This was a cross-sectional study implemented in 2001. The three villages had been selected because only 1000 Olyset bednets obtained from the Sumitomo Chemical Company in Japan in 1999 were available for study purpose. Also, the study was of a small size due to the short budget of the funds that were available to support fieldwork expenses. The villages had been selected randomly from a list of the villages in each district. Based on records obtained from the village government offices, each village had about 1000 residents (with a family size of 5 in 200 households). Therefore, it was estimated that out of the nets available for study, 333 had to be allocated per village. One net remaining was offered to a widow who had a breast-feeding baby.

As elaborated in the subsequent section of this paper, a formative retailers survey had to be carried out in the three villages to establish the basis for identification of the actual and potential bednet retailers. The number of retailers working in shops or kiosks in each village was unknown in advance by the study team. Therefore, it was decided that this should be left to be determined after the planned formative phase of the study. Report from such surveys shed the light to identification of the retailers who could volunteer to act as sales agents/representatives or marketers of the study Olyset nets and as basis for determining the price to fix per Olyset net (**Table 1**). Eventually came up with 71 shop/kiosk retailers (37 in Mazinde, 17 in Mgombezi and 16 in Mkanyageni) who were involved in the interviews, no any non-respondent was noted.

Data Collection Methods, Study Phases and Issues

The study was planned to cover two phases: a formative (pre-intervention) phase and an intervention phase. Pre-implementation surveys have the advantage of providing guidance regarding things like the distribution, pricing, and health education about bednets [14].

Formative Phase of the study

The formative phase preceded the intervention phase and involved a survey of local retail markets for bednets and baseline interviews with key informants such as retailers and village government leaders regarding bednet availability, ownership, utilization and preferred price per net, presence and potential retailers for marketing the study nets.

In both the formative and intervention phases of the study, there was a scenario for demonstrating Olyset nets to the study

population by showing them the study net itself, how to fit it to the bed, its durability, and other benefits of the net study ITN materials including the insecticide itself and and net re-treatment approaches. This demonstration was aimed at avoiding asking blindly questions regarding households' WTP for a commodity which the respondents could not be seeing or had never seen. This approach has been used elsewhere e.g. in India [19] and Nigeria [29].

Criteria for setting a price per the Olyset bednet under study

We found in the commercial sector that Olyset nets were neither popular nor stocked locally while polyester nets were popular, although mostly used untreated. In the local market outlets the price per un-treated polyester net ranged between 2,500 and 3500 shillings (US\$1 was equivalent to 1100 shillings) for a medium sized net to 4500 shillings for a large net in both districts. This increased our confidence that communities would find it more privileged to buy an Olyset net if the price was a little higher than 3,500 shillings. However, our original strategy was to assess household WTP a price of shillings 3,500 (about US \$ 3.2) per net.

The intervention Phase of the study

The intervention phase involved distribution of Olyset nets to selected retail outlets and the research team moving with several boxes with nets for offering to the respondents who might express their WTP at the fixed/stated price. *How was this done?* - Initial contact was made to local government leaders so as to obtain a list of households in each village based on which a random selection of the heads of households or their representatives for interview could be done. Since the available lists were not updated, the study team decided to enter the villages and select the households randomly under the escort and guidance of hamlet leaders. A total of 416 household members responded to the interviews. The total number of households

required for interviews was estimated by assuming 20% bednet utilization rate in the two study districts and this was accomplished using EPI-INFO software programme. The ultimate distribution of the 416 households was: Mazinde (141), Mgombezi (135) and Mkanyageni (140) for the formative phase of the study.

Follow up was done during the intervention phase of the households who expressed WTP the stated amount (shillings 3,500) per net at some future dates so as to confirm their actual WTP. The dates on which follow up was made to the households concerned was based on the appointment made to the research team by the households.

Question designs and applications

In the formative phase interviews with household members, the first question on WTP stated ‘*if the price per this type of the net (Olyset) was shillings 3,500, will you be willing to pay?*’ The questionnaire also contained other questions with binary answer options (Yes/No) and others with closed-ended question with polychotomous answer options (Yes, No, Maybe/it depends/Don’t know). Sometimes the respondents were asked to state their WTP if the price were a little lower or higher than shillings 3,500 per net. The different prices were pre-coded in different ranges of the total amount individuals would express their WTP. As for the questions with pre-coded prices, the interviewers had to circle accordingly on the questionnaire the code of the price range mentioned by the individual respondent. Clarification was made regarding what the terms ‘a little less’ or ‘a little more’ meant, and it actually meant a decrease or an increase in the price by at least 200-500 shillings (Table 2).

A similar question approach during the formative phase was applied when interacting with selected members of households during FGDs based on open-ended questions. Three FGDs with participants of different characteristics have been conducted in each village. The open-ended question allowed the individuals to express themselves without external influence by stating their WTP per net. The first question stated as follows: ‘*Suppose nets of this type (while showing the sample net) was available for sale, would you be willing to buy any?*’ In case the response was ‘Yes’, the respondents were asked again: ‘*How much would you be willing to pay per net?*’ Notably, different prices were proposed in different FGDs conducted in each village (Table 3).

Decision to apply open-ended kind of questions accompanied by closed questions in the same study is valid since closed questions dictate answers to the respondents, hence creating methodological bias which lowers the reliability of the results [34]. Issues related to attitudes of the study participants towards the study nets, availability of bednets in the retail markets, household access to cash money and expenditure and health seeking behaviour for malaria prevention, opinions to the best season for marketing bednets, an payment options for ITNs in rural settings, have also been investigated among all the types of participants.

Binary-with-follow-up technique in the intervention phase

The data analysed from the formative phase involving a household survey enabled the research/study team to identify the names of respondents who stated to be willing to pay shillings 3,500 per net if followed up later. Coincidentally, the respondents who said ‘Yes’ during the baseline survey were 104 each in two villages – *Mkanyageni* and *Mgombezi* while in *Mazinde* village they were 114. Out of those who gave a ‘Yes’

answer in each study village, a systematic sampling was done to identify 26 interviewees, one per household (by selecting every 4th name starting with the first one) for being followed up later to confirm their WTP. Of the respondents followed up, males constituted 15(58%), 11(42%) and 10(38.5%) in Mkanyageni, Mgombezi and Mazinde villages, respectively. In terms of religion, 6(23%), 13(50%) and 2(7.7%) of the respondents in the latter villages, respectively, were Christian while the rest were Moslems. Those who upon being followed up expressed to still being unable to pay the stated amount on the same day were given another chance (i.e. have been asked) to specify the next date they thought they could have mobilized cash for paying and for how many bednets. Appointment was made with those who accepted the latter option.

Households expression of WTP at their convenient time without being followed-up

Appointing the study net sales representative retailers as stated above was intended to allow the individual households pay for the nets at their convenient time when they access cash as they have been doing for other commercial products. This was done after consulting other researchers who applied the same approach in Tanzania [3] and Nigeria [29]. To start with, 150 bednets were distributed to each study village. The selected shopkeepers were supplied with batches of the study nets in March 2001. Monthly follow up was done to monitor and evaluate the trend of sales in each village in different seasons which could be influenced by seasonal availability of cash as evidently common in SSA [4].

Data Analysis and Reporting

Completeness for the household participants

For some of the questions used in the household survey, multiple responses/answers were allowed. The percentages presented were calculated based

on the total number of the responses rather than of the interviewees. Also, unclear data were cleaned and dropped during the analysis to allow the percentages presented to be calculated based only on the total number of the clean answers rather than the total number of the interviewees. Not all the interviewees responded to all the questions, hence the percentages given represent the proportion of the responses obtained rather than the total number of the 416 interviewees involved for the whole study. Data from FGDs, interviews using open-ended questions and field observations were transcribed, coded where appropriate and interpreted accordingly.

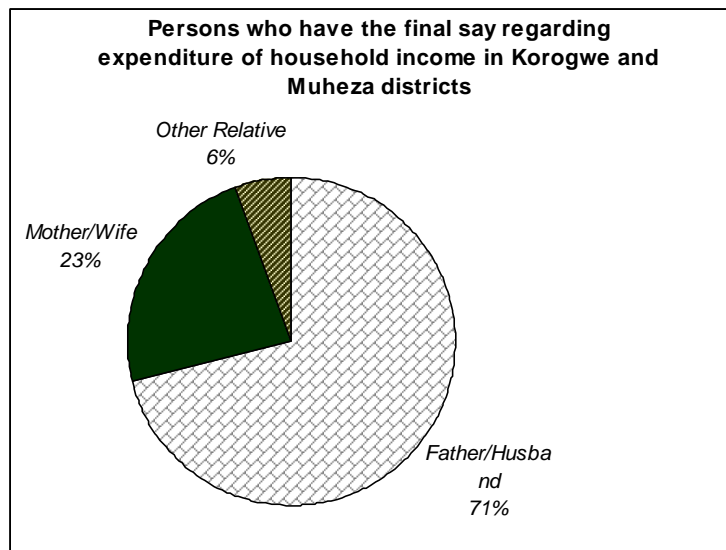
RESULTS

I: Formative Phase

Characteristics of individual household respondents

Coincidentally, the mean and median family sizes of the 416 households visited were 6 each while the mean and median ages were 42 and 39 years respectively, with the age ranging between 15-90 years. Out of all the individual household respondents, 234(56.2%) were males. Of all households, 320(76.9%) were male-headed; 312(75%) were married, 70(16.8%) were single, 17(4.1%) were divorced, 6(1.4%) were cohabiting, and 4(1%) were separated. Religiously, 295(70.9%) were Moslems and 119(28.6%) were Christians. Literally, 312(75%) had completed primary education and 27(6.5%) had attended secondary education.

The ownership and expenditure of household income indicate male dominating in income ownership and control of decisions on its expenditure (Figure 1).

Figure 1

Ownership of, and attitudes towards ITNs

Data showed that out of all the household interviewees, 72(17.3%) had never seen ITNs; 383(92.1%) and 31(7.5%) had previously used the untreated nets and ITNs, respectively. Only 22(4.8%) respondents possessed at least one ITN in their households during the study period while 215(51.9%) indicated to possess at least one untreated net. Given an opportunity to choose between the two types of the nets, it was found that of 416 respondents, 390(94%) preferred ITNs to non-ITNs, 13(3.1%) were indifferent while 4(1%) said that they could not choose any.

In all the three villages, FGD participants admitted that despite people knowing that burned certain tree leaves or barks or cow dung as mosquito repellents. The burning of mosquito coils and in-door residual sprays was also reported to be a practice among a few residents who afforded using such materials regularly. Lack of ITNs in local commercial outlets was also reported besides people's low ability to buy them. Except for matters related to the size of the net and net meshes, Olyset bednets were preferred to polyester nets (and for their blue

Most of the respondents (97%) out of those who could opt for ITNs appreciated the repelling/killing potential of such nets against the nuisance mosquitoes. Two respondents argued that they would like ITNs because these were the ones more recommended. More than half of the individual household respondents (data not shown) were in favour of the blue colour of the study Olyset nets on ground that white coloured nets require regular washing of the dust or soot acquired in houses using firewood.

prevention is better than cure, most of the residents rarely used ITNs and instead they

colour) among all the participants in the nine FGDs conducted. All the FGD participants also viewed that ITNs were much better than the untreated nets because ITNs can repel and kill mosquitoes and other small insects such as cockroaches disturbing in-houses. In terms of net sizes, the majority of the FGD members in Mgombezi village expressed their preferences to nets of smaller size that can fit on a bed size of 3.5 x 6 feet (length by width) and indeed during the survey most

households were found possessing beds of this size. Their counterparts in other villages mostly preferred bednets that could fit on a bed size of 6x6 (six-by-six) or 5x6 feet that was more protective by keeping someone far from mosquitoes than smaller nets. Unfortunately to them (though a good finding for this study) most of the present study nets were of a medium size that could fit better on 4x6 feet bed. Some respondents expressed their doubt about the size of Olyset net meshes on ground that they seem to allow mosquito penetration. Therefore, it was said that they wouldn't buy such types of the nets unless they heard from users who were satisfied with them.

The stated (perceived) WTP for Olyset nets among the individual household interviewees

Responses from 416 household respondents to the first question eliciting their WTP for the study nets (before specifying the price) indicated that 353(85%) said yes, 8(2%) said no while 54(13%) were uncertain (they said 'maybe'). The mean WTP price stated per net was shillings 1,357/= while both the median and modal WTP prices ranged between shillings 2000 – 2999. Some categorical responses without specifying a unique price per net were obtained (Table 1). Answers like, '*I would pay not more than.....shillings and I think betweenand*

.....shillings would be fine', were occasionally stated.

Table 1. WTP prices as hypothetically stated by 416 household respondents in Korogwe and Muheza villages: prices stated freely by the respondents before being elicited on specific price levels fixed/suggested by the study team

<u>Ranges of Price Rates (in Shillings)</u>	<u>% of 415 households who responded to the open-ended question 'Suppose ITNs were brought... .., how much would you be willing to pay?'</u>
Were pre-coded on the questionnaire and ticked accordingly as each respondent answered	
0-999	15.4
1000-1999	23.3
2000-2999	33.2
3000-3999	16.6
4000-4999	2.9
5,000 or above	0.7
Uncertain	7.9

Notably, 233(56%) respondents said 'yes' indicating a positive WTP, 25(6%) said 'maybe' indicating uncertainty while 158(38%) said 'no' indicating their unwillingness if the price per net were equal to shillings 3,500. Others expressed their WTP if the price was a little less than shillings 3,500, although some could not specify the number of nets they would take (Table2).

Table 2. Number of Olyset bednets the responding households felt they would be willing to take if the price per net were equal to or a little less than shillings 3,500

Number of bednets	Percentage (%) of household respondents out of the 416 interviewed	
	If the price were equal to shillings 3,500	If price were a little less than shillings 3,500
None/not stated	52.4	19.2
Uncertain	6.3	6.7
1	21.6	19.7
2	14.2	28.4
3	3.1	14.9
4	1.9	8.2
≥ 5	0.5	2.9

Price preferred by shopkeepers and village FGD participants

FGD participants

Household members falling under different age groups who were involved in the FGDs gave different opinions regarding the

desirable price per an Olyset bednet. In all the three villages, it was indicated that charging ≥ 3000 shillings was unaffordable to most of households (Table 3).

Table 3. Price per Olyset bednet as suggested by different FGD participants in the three villages

Price Level (in Tshs)	Mazinde			Mgombezi			Mkanyageni		
	Young Men (18-35 years)	Adult Men (36 years & above)	Women (15 years & above)	Young Men (18-35 years)	Adult Men (36 years & above)	Women (15 years and above)	Young Men (18-35 years)	Adult Men (36 years & above)	Women (15 years & above)
≤ 2000	X	X	✓	✓	X	✓	X	X	✓
2000-2500	X	✓	X	X	X	X	✓	X	X
2000-4000	✓	X	X	X	X	X	X	X	X
2000-5000	X	X	X	X	✓	X	X	X	X
2500-5000	X	X	X	X	X	X	X	X	✓

Key: The X sign indicates that the particular level of price has not been suggested by the respective FGD. The tick (✓) implies that the majority of the FGD participants proposed that price.

Shopkeepers

Likewise, the majority, 24(64.8%), 16(100%) and 16(100%) shopkeepers in Mazinde, Mgombezi and Mkanyageni villages, respectively, suggested a price amounting to \leq shillings 3000 per net. Only

13(35.2%) shopkeepers in Mazinde village suggested a price \geq shillings 3,500 per Olyset net under study. One shopkeeper's records on this aspect had been lost and so the information was missed. Individual shopkeepers also suggested different prices

per net. To avoid presenting all the different prices suggested, the data presented in Table 4 summarize the mean prices suggested in each village. Shopkeepers' experiences with local residents' ITN buying behaviour is also illustrated. Notably, 32(86.5%), 17(100%), 16(100%) of all the shopkeepers in Mazinde, Mgombezi and Mkanyageni

villages, respectively were in favour of \leq 3,500 shillings per the study net and only 3(4.2%) shopkeepers suggested \leq 2000 shillings per net.

Table 4: Experience and suggestions from shopkeepers about the possibly affordable prices per Olyset net, and other information collected from them during the baseline survey

Type of Question	Number and % of respondents per Village		
	<i>Mazinde</i> (n = 37)	<i>Mgombezi</i> (n = 17)	<i>Mkanyageni</i> (n = 16)
Are you currently dealing with bednets business?			
Yes	10 (27.0%)	0 (0.0%)	1 (6.3%)
No	27 (73%)	17 (100%)	15 (93.7%)
Have you ever participated in the bednets business before?			
Yes	24 (64.9%)	3 (17.6%)	2 (12.5%)
No	13 (35.1%)	14 (82.4%)	14 (87.5%)
Do you think the residents of this village have a tradition of sleeping under bednets?			
Yes, the majority	18 (48.7%)	4 (23.5%)	1 (6.3%)
Yes, but a few	17 (45.9%)	13 (76.5%)	13 (81.2%)
I don't know	2 (5.4%)	0 (0.0%)	2 (12.5%)
In the last 12 months how frequently have experienced customers coming to your shop asking you (with an intention of buying) about bednets or insecticides for the treatment of bednets?			
Many times	11 (29.7%)	1 (5.9%)	3 (18.8%)
Rarely	14 (37.3%)	4 (23.5%)	3 (18.8%)
Never	2 (33.0%)	12 (70.6%)	10 (62.4%)
Do you personally have a bednet (whether treated or untreated) at your home?			
Yes	34 (91.9%)	17 (100%)	15 (93.8%)
No	3 (8.1%)	0 (0.0%)	1 (6.2%)
What do you think would be the best season/period for marketing/selling bednets in this village?			
Rainy season	31 (83.8%)	9 (52.9%)	8 (50.0%)
Dry/harvest season	3 (8.1%)	6 (35.3%)	8 (50.0%)
Can't specify/it depends	3 (8.1%)	2 (11.8%)	0 (0.0%)
Prices (in shillings) as suggested by individual shopkeepers if they were they ones selling the demonstrated Olyset type of bednets (after data analysis)			
Mean price	3,010	2,500	2,775
Median price	2,250	3,000	3,000
Modal price	3,000	3,000	3,000
Price Range	1,000-4,500	1,500-3,000	1,500-3,500

Note: Estimated US \$ 1 = Tanzanian Shillings 970 at year 2000-2001 open-market exchange rates (on average)

Perceived best season for supplying bednets

In Mkanyageni, village government leaders and FGD participants were in favour of the rain season as most appropriate for communities to express their actual WTP since it is the period when infectious mosquitoes are at peak. In contrast, most of the FGD participants in Mgombezi and Mazinde villages viewed that ITNs would be more purchased during crop harvest seasons, particularly between June and September when most of the residents have access to cash money after crop harvest.

Perceived alternative payment options for ITNs

Of the 416 respondents to the question on alternative payment options for ITNs in rural settings if an opportunity were given, 258(62%), 104(25%), 50(12%) and 4(1%) suggested cash, in-kind (including offering crop harvests or animals such as chicken), either cash or in-kind depending on what the buyer could access, and none of the payments, respectively.

II: Intervention Phase

Assessing the trend of actual bednet sales at the selected retail shops

After every two weeks, the research staff visited the study net sales agents to record the net sales and additional opinions from the agents about their experience with their customers who were visiting their shops and showing interest in the study nets. As reported in Mgombezi and Mazinde villages, most of the customers did not complain about shillings. 3,500 fixed per net, although the rate of net sales remained low during the first three months (March-June) when the residents had not harvested their crops. While in Mkanyageni village reports were given about the complaints against the net price, but such complaints were notably decreasing as the maize harvest season was approaching.

A few nets were sold on instalment basis to people who asked to pay that way and promised to keep their appointments. Trends in net sales indicated that, up to end of July in the same year (2001), 108(72%) of the bednets were bought in all the three villages, with variations in the total sales from one village to another as follows: Mkanyageni (37), Mazinde (38 and Mgombezi 33). Most of the bednets 44(29%) in all the three villages were bought during the month of May, with about half of such nets being sold in Mgombezi village. Up to 30th January 2002 only 158 nets had been sold in all the three villages.

Follow-up of households to confirm their WTP

None of the 26 households who were followed-up based on responses obtained from a BWFU question to ascertain their WTP actually paid as they promised. The composition of those who were followed-up by gender was as follows: Mkanyageni (15 men, 11 women); Mgombezi (11 men, 15 women); Mazinde (10 men, 16 women). For reasons that could not be known directly by the research team 42 respondents were not

even found at home on the first day of follow up. As it was reported, some were busy working in the *shambas* (farms) while others were attending to other activities outside their homes. None of their representatives (a spouse, daughter, son or other relative) found at home were left with any money for paying on behalf. Even when the research staff set new dates of appointments with the respective households, the story was the same as none of the followed up eventually paid. These findings were disappointing when compared with what were obtained from Nigeria using a similar approach [29].

DISCUSSION

Perceived versus real WTP

The findings from a BWFU question in this study confirms that WTP in is not synonymous to ATP [28, 30]. As shown, more than half the individual household members interviewed and those involved in the FGDs suggested a price which is less than or equal to shillings 3,500 per Olyset bednet, implying the possibility that if the price suggested by them were the one used for testing their WTP, most if not all of the households would have actually (revealed) their WTP for at least one net. So, it evident that price is one of the key determinants of WTP [35] However, one cannot underrate the possibility that some of the respondents dishonestly reported inability to pay as a way of informing the investigators that the bednets must be provided either for free or at very low prices.

As found in the present study, ownership of ITNs in all the three study villages was very low and some individual respondents reported having never seen ITNs, implying that the commercial private sector had not succeeded penetrating the potential market for ITNs adequately and therefore a concerted social marketing involving where possible public and private sector partnership might have made a reasonable difference especially in remote areas where

the bednet vendors might have been finding it hard to reach/operate at a profit. It is, therefore, possible that some of the respondents who were uncertain about expressing their WTP for the study bednets were less familiar with the types and benefits of such materials due to lack of exposure.

What does this study add to the existing literature on WTP for bednets studies?

The results from application of a BWFU question in the present study indicate that the context in which the study was applied was different from those of other areas where almost the same approach was used and came up with encouraging results on community's WTP [28]. The differences in the results could be attributed to differences in socio-economic and demographic characteristics of the study populations; types of nets used in the study. However, there is no guarantee that if the nets were homogeneous the results obtained would differ those from those of the present study

The suggestion of payment by instalment resembles what other previous studies in Tanzania recommended [15]. Also the present study reveals that most of the respondents in rural settings prefer nets of different sizes which are not white coloured. The sceptics who expressed doubt about the large mesh size of the Olyset net and the durability of this net without easily losing its insecticide efficacy reflects more or less similar findings to those reported by other authors from several villages in Dodoma and Kibaha districts in Tanzania [16].

Study strengths and limitations

The present study methods are justifiable as they show that assessing community WTP for health products such as ITNs using different elicitation techniques is possible and allows triangulation of the results from the different methods used [36]. The difficulty arises when it comes to developing a general conclusion about the optimal price

people would be willing to pay based on different results obtained using different elicitation techniques. The limitations of different WTP study techniques. For instance whether or not to use open-ended questions as those used in FGDs or structured closed-ended questions remain critical and widely debated in the literature as cited from the literature in the background section above. Despite the CV techniques having been widely used in the health-care field, they have been noted to have weaknesses in predicting the real WTP. However, still there is no any other technique identified to be more advantageous [29]. As perceived by the FGD participants and household interviewees in this study and as discussed elsewhere [11], it is possible that had the study bednets were distributed in the study villages at the beginning of (or during) the rain season when people associate the falling of rains with malaria or during the harvest seasons when people have cash from sale of crops, more residents might state and eventually reveal their WTP. Furthermore, this study missed information that could compare the WTP of the residents from rural areas and their urban counterparts.

The study team noted that using bednets sales agents such as shopkeepers is much more costly to a small scale study of the present type because of regular visits made to monitor the trends of sales and collect the little and sometimes unpredicted revenue from net sales agents. This consumes a considerable amount of time, fuel, and creates other inconveniences and opportunity cost associated with travel. The demand for health products such as ITNs may not be predicted in settings where people give little priority to allowing expenditure on prevention, unless a strong social marketing component was assured beforehand to sensitise the communities concerned.

Conclusion

Olyset nets have potential to attract many people if marketed (including careful advertising with reasonable prices informed by research and made physically accessible, especially in the market already dominated by polyester nets. ITNs marketers should not neglect the communities with different socio-economic characteristics so as to be able to reach even the population living in remote settings where the traditional businessmen or public health programmes have not been reaching. Subsidizing prices of the nets and allowing payment by instalment has potential to motivate poor households reveal their WTP. The LLIN manufacturers need information on different sizes of nets preferred by different target and potential customers. Based on the present study, we support the recommendation from previous studies that LLIN especially of Olyset type should be widely promoted in SSA to contribute to effective prevention of malaria infections [7, 16, 18, 37-39].

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Competing Interests. The authors declare that there was no competing interest in this study.

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