

Community satisfaction with indoor residue spraying for Malaria control in Karonga, Northern Malawi

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Abstract

Background

The Malawi National Malaria Control Program conducted Indoor Residual Spraying (IRS) in 2010 and 2013 in selected hot districts along the valleys including Karonga, but no study has been done to measure community satisfaction levels in these areas.

Aim

To assess satisfaction levels of community with IRS in both rural and urban settings, in Karonga district.

Methods

A cross-sectional study was conducted in urban village of Mwachimba and rural village of Fundi. Qualitative and quantitative data was collected from households' representatives through Focus Group Discussions (FGDs) using De Wets's Schutte tool. Qualitative data was analysed using thematic analysis while numbers and percentages were generated using Microsoft excel.

Results

Overall level of satisfaction in Fundi was estimated at 69% while that of Mwachimba was at 60.9%. In Fundi village, 66.1 % (37) of the household representatives were satisfied while in Mwachimba village, 60.7 % (34) were satisfied with the IRS programme. Factors that led to satisfaction were minimal adverse effects of the chemical on people after spraying, killing of other insects, sprayer's courtesy and good communication. Factors behind dissatisfaction include: short residual effect of the chemical used, over-dilution of the chemical and minimal community involvement.

Conclusion

Despite finding high satisfaction levels in rural village than in an urban village, overall all the villages reported low levels of satisfaction with IRS due to various factors some of which common to both villages. Karonga District Health Office needs to involve the community in the process of spraying by recruiting sprayers from the target area and also explaining the purpose of dilution and the dilution factor to community members.

Introduction

Indoor residual spraying (IRS) is defined as occasional spraying inside house walls with a persistent insecticide to reduce mosquito life-span and density resulting introduction in malaria transmission¹. When mosquitoes enter houses during the night to feed on the occupants, they rest on the walls, roofs and eaves prior to or after feeding. Contact with sprayed surfaces make mosquitoes absorb the chemical which can kill them¹. IRS and Insecticide Treated Nets (ITN) are the most reliable primary prevention tools for malaria control. Studies on IRS and ITN efficiency comparison have indicated almost the same level of cost effectiveness, however, choice of an intervention depends on feasibility of local resources². Other studies have revealed that IRS has an advantage over ITN since a wide range of insecticide can be used¹. A variable use of chemical in IRS has an advantage of reducing the rate at which vector resistance to chemical develops. A comparison of IRS and ITN confirmed that IRS reduces malaria incidence in unstable malaria settings³.

In the 1950s and 1960s World Health Organization (WHO) led malaria eradication campaign and succeeded in eliminating

the risk of malaria infection to about 700 million people in different parts of the world⁴. In Africa, IRS intervention was neglected except in some countries in southern and eastern Africa where IRS remained in use⁴. Malawi revived the use of IRS as an intervention for controlling malaria transmission as a result of increased political and financial support for malaria control¹. IRS has been conducted in Malawi since 2007 in the two sugar estates of Nkhotakota and Chikwawa; as well as small pilot projects in Ntchisi and Mzimba with the funds from African Development Bank (ADB). In 2010, IRS was conducted in Nkhota-Kota and Salima districts with the financial assistance of the United States Agency for Development. In Karonga, Nkhata-Bay, Mangochi, Chikwawa and Nsanje IRS has been supported by the government of Malawi through the Global Fund¹. In Karonga, IRS was first conducted in December 2010 and was expected to be conducted again in 2011 by the Ministry of Health but was never conducted due to logistical and financial problems until January 2013⁵.

IRS training guide on malaria prevention for Malawi clearly states that every IRS spraying round need to be followed by an evaluation survey¹. In Karonga two rounds of IRS were conducted in December 2010 and January 2013. Despite these two spraying rounds, no survey has been conducted to measure community satisfaction with respect to IRS⁶. Research has revealed that satisfaction of the consumer with health services has a great impact on utilization and adherence to health services⁷. In a similar manner, if the community is not satisfied with IRS it will cause negative impact on utilization and adherence. According to the study done in Uganda, it was discovered that there was 50% low perception with IRS compared to the expected 95% and this was not adequate to promote adherence and utilization of IRS⁸.

The prevalence of malaria in Malawi was at 28% in 2012 while that of Karonga district was at 314 cases per 1000 population⁹. The recent prevalence of malaria from Karonga district data from January to June 2014 was at 508 cases per 1000 population¹⁰. It is therefore imperative that the timely detection of bottlenecks in IRS ensures that adequate responses are made to address the same. In view of the above, researchers felt it necessary to establish community satisfaction with IRS in the district in order to incorporate it in planning for the coming IRS exercises.

Methodology

This study was cross-sectional where qualitative and quantitative data was collected from households' representatives through Focus Group Discussion (FGD). Qualitative data was collected with the intention to gather in-depth information that would lead to establishment of satisfaction levels and associated factors. The FGD was used because it provides a chance to obtain perceptions on a defined area of interest in the manner as required. This include permissive, socially oriented, flexibility, high face validity, short time and at low cost¹¹. In addition, FGDs also increases high face validity since it provides chance of interaction between researcher and participants. Sampling of participants was done using maps of the villages of Mwachimba and Fundi where the study took place. Maps

were drawn with the help of health surveillance assistants and community volunteers living in these villages. Each map was portioned into cells as shown in Figure 1 numbered 1 to 8. From each cell, an equal number and similar characteristics of study units were selected using village health register. This technique was chosen because it ensures that every group of the community is represented according to age, sex and location within the study village¹².



Figure 1: Village schematic diagram divided into 8 cells²

From each cell study units were represented according to age and sex as in Table 1, while other factors such as level of education are overcome by using Schutte scale¹². Using the technique which was adopted from the works of De Wet Schutte, Table 1 below shows the composition of FDGs generated.

Table 1: Sample size derivative

Sex of study units	Age range (in years)	Total study units in FDG
Males FDGs	45 plus	8
	25 to 44	8
	16 to 24	8
Total male study units:24		
Female FDGs	45 plus	8
	25 to 44	8
	16 to 24	8
Total Female study units 24		
Total (Females + Male)		48
Community leaders:	8	
N for each village:	(24+24+8) =	56

From table 1, each village had a sample size of 56 that included 8 community leaders. Since two villages were used, the sample size was 112.

The study was conducted in two villages, one from urban (Mwahimba) and the other from rural Karonga Fundi. Karonga was purposively selected because it is one of the few districts in Malawi where IRS is being conducted. The study was done in rural and urban settings because research has shown that people in different settings have different perception toward IRS¹³. Mwahimba village is in the catchment area of Karonga district hospital under Traditional Authority Kyungu. It is at a distance of about 4 km from the district hospital. On the other hand, Fundi village is in the catchment area of Kaporo rural hospital in the Traditional Authority Kilupula. It is located at a distance of about 15km from Karonga district hospital. Locations of these villages are shown in Figure 2 above.

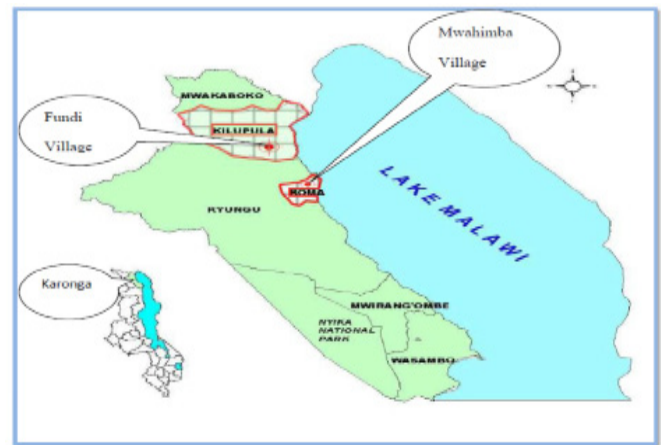


Figure 2: Map of Karonga with demarcations of Traditional Authorities¹⁴

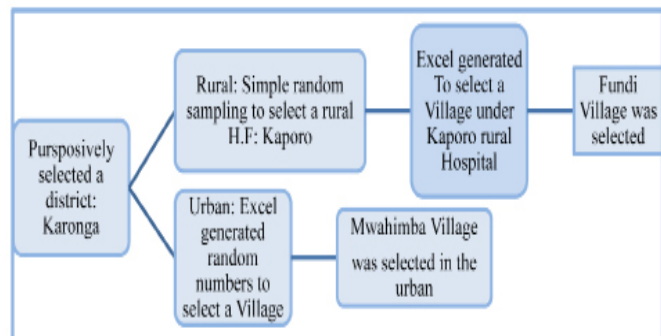


Figure 3 below illustrates how selection of the two villages was done.

Data was collected using the Priority Index question guide (P-Index), Community Index questionnaire (C- Index) and Community Bonding questionnaire with the aid of a Schutte scale. Using P-Index, data was collected and arranged in order of their priority. The study units in an FDG are asked to establish a list of needs and arrange them in order of their priority. The use of P-Index is not paternalistic since respondents are not presented with an already-made list of items as it is the case in other methods. The higher the P-Index value, the higher the priority and the values range from 1 to 11 as in Figure 4 below. For instance, a variable with high value of importance such as 11, but smallest value of satisfaction 1 assumes a highest priority. This is so because a satisfaction value subtracts from an importance value. These values are averages of all study units in FDGs.

Unlike in P-Index, C- Index uses already made questions and measures satisfaction levels not priority. The FDGs are provided with a list of variables for the study units to rank their satisfaction of each variable on a list. The community ranks satisfaction level of variables using same instrument (Schutte scale). C-Indices are computed by calculating the mean of all study units responses on each variable. For community bonding, questionnaire gathers information about the amount of bonding that do exists in a community. Bonding assessment involved three elements namely: the extent to which social support services were available for those that needed help in the community, friendship circles that existed within the community and sense of belonging to the community¹². Community bonding score from Schutte scale of one (1) indicated a poorly bonded community while eleven (11) indicated a strongly bonded community. The Schutte scale used is a wooden instrument with a scale of 1

to 11 as shown in Figure 4 below.

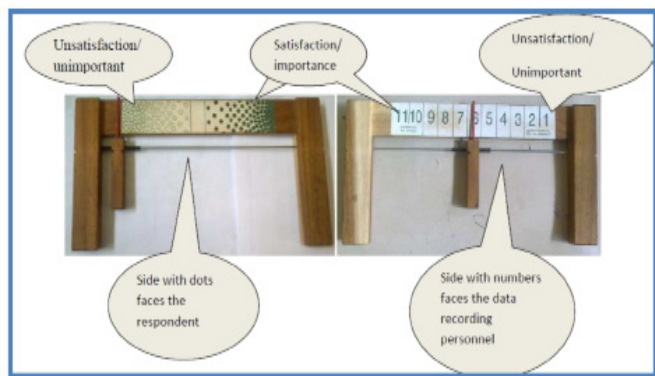


Figure 4: Schutte scale²

In order to ensure quality data tools were checked right away in the field for completeness. Since this project was comparative in nature between two villages, results from rural setting (Fundu village), were analysed first, followed by the urban setting (Mwahimba Village). P-Index results have been presented in a horizontal graph in the order of their priority of variables measured. On the other hand, C-Index results have been presented in circular graphs with numbers starting from outside and ending in the centre of the circle. Results of C-Index and P-Index have been merged to see if the same reasons that the community contributed during P-Index data collection also appeared in C-Index. Scores of satisfaction on each variable were used to compute level of satisfaction. For example if the value of a variable was 9, it meant that a household was 9 times satisfied out of 11. Therefore satisfaction level of that household with IRS variable in percentage was $[(9 \div 11) * 100] = 81\%$. This process was repeated for every household and every variable in the C-Index.

Results

Fundu Village (Rural)

In Fundu village, 48 people took part in the FGD and the results are presented in the Figure 5 below

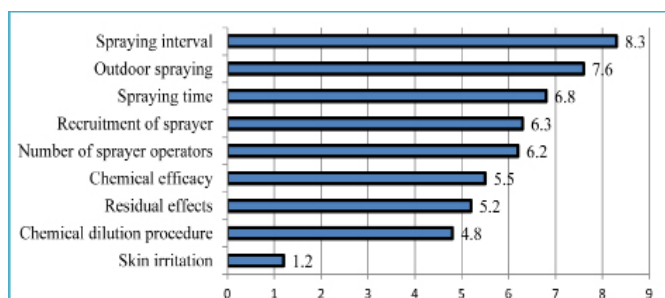


Figure 5: P-Index for Fundu Village

In the Figure 5(P-Index for Fundu) there are nine variables ranked from highest priority (spraying interval, P-Index: 8.3) to the least priority (skin irritation after spraying, P-Index: 1.2). One of the issues behind the above ranking of issues was spraying interval as quoted: "...we need spraying services every month because chemicals seem to be effective for a short period", – FGD male 45 years old and above. "We were communicated that the spraying will be done in the next twelve months after December 2010, we expected the next round in the month of December 2011 instead the next round was conducted in the month of February 2013. We need government to improve on its promises".-FGD female 25 to 44 years old. The other issue was outdoor spraying and this was quoted from respondents as follows: "actually we do not see the connection of spraying on the indoor wall surfaces while mosquitoes

breed outside. This is illogical; therefore, you should also spray in the bush and stagnant water because mosquito breeds there." –FGD male 25 to 44 years old and FGD female 16 to 24 years old. "We spend much of our time outdoors and sometimes sleep outside because it is hot here for this reason we need outdoor spraying." –FGD male and female 24 – 44 years old. On spraying time, respondents suggested that the spraying service should be done during the month of January to March. The following comments illustrate this point: "This is a rice growing area, during rainy season we experience a lot of mosquitoes than dry season. So to enhance the effect of chemical use for spraying, and the service needs to be done during rainy season"-FDG males 25-45 years old.

The other issue was recruitment of sprayers; participants of FGD expressed dissatisfaction with recruitment of the sprayers. From the findings, it is clear that they would like sprayers for each village to be recruited from same the same village as quoted: "Why should government bring strange people in our village while people of the same age and qualification are available here?" – FGD males 16 to 24 years old. The FGD of females aged 16 to 24 and males aged 16 to 24 years also noted the inadequate number of spray operators as illustrated in the extract: "We need more spray operators because last time they came to spray they were spraying in a hurry we suspected that they were given number of houses to cover by each sprayer operator in a day. If sprayer operators were adequate, they wouldn't be spraying in haste as they did." All six groups voiced out their dissatisfaction with the effectiveness of the chemical used. Their view was illustrated in the following quote: "On the first day I slept well but on the second one it was not easy because there were a lot of mosquitoes. I thought that it would take more than six months without being bitten by mosquitoes, but it only took one day". – Female 16- 24, 25 – 44 and male 45 and above years of age.

Two out of six groups (33%) also expressed their concerns about chemical dilution. They wanted to be seeing how chemicals were diluted because they suspected over-dilution. Only one group expressed concern about skin irritation after spraying.

The FGD was also conducted with 8 community leaders and below are the P-Index results.

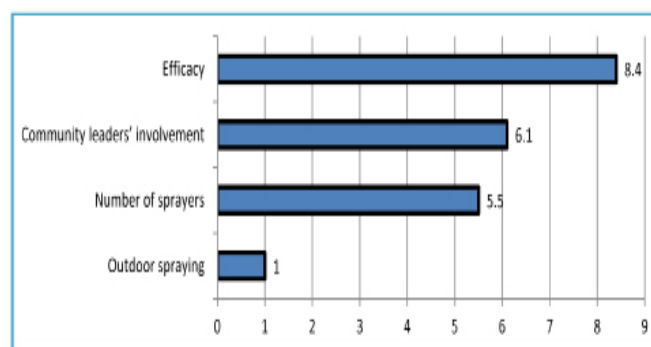


Figure 6: P-Index Community Leaders for Fundu Village

The main issues for community leaders included how well the chemical killed the mosquitoes, involvement of the community in the spraying exercise and number of sprayers (Figure 6 above).

The C-index results are presented in Figure 7 below. In this case the closer to the centre the more satisfied the community was and the vice versa.

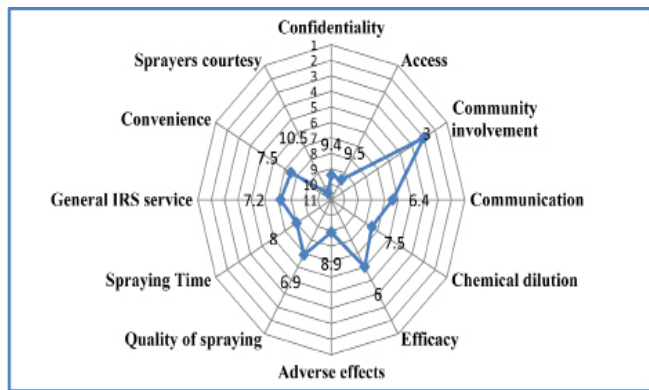


Figure 7: C-Index wheel for Fundi village

Satisfaction of the community with IRS is at least 66.5%. There are 12 variables in the C-index wheel each with maximum value of 11. From the C-Index wheel (11x12=132) which is a denominator in C-Index percentage calculation. As shown in Figure 7, the community of Fundi is satisfied with some current issues of IRS implementation including sprayers' courtesy, confidentiality of issues in the house and access to all households. The Factors associated with dissatisfaction of community with IRS included community involvement, quality of service, chemical efficacy, residual effects and communication. For community leaders, their satisfaction levels are presented in Figure 8 below.

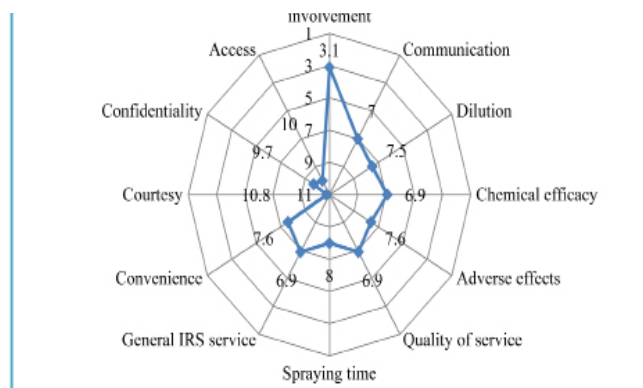


Figure 8: C-Index wheel Community leaders, Fundi village

Community leaders' satisfaction level with IRS in Fundi village is at least 69.6%. They showed satisfaction with courtesy, confidentiality and access and were dissatisfied with minimal community involvement and others just like other members of the village. The satisfaction levels have been summarized in Table 3 below.

Level of community satisfaction with IRS	Level of households satisfied with IRS
Other members of the community (a) 66.5%	Other members of the community 30 HH (n ₁ =48)
Community leaders (b) 69.6%	Community leaders (n ₂ =8) 7 HH
Mean = (a+b)/2 68%	Overall = [(30+7)/(n ₁ + n ₂)]*100 66.1%

Table 3: Satisfaction levels summary for Fundi village

The community bonding was very high at 10.9 as shown in Figure 9 above.

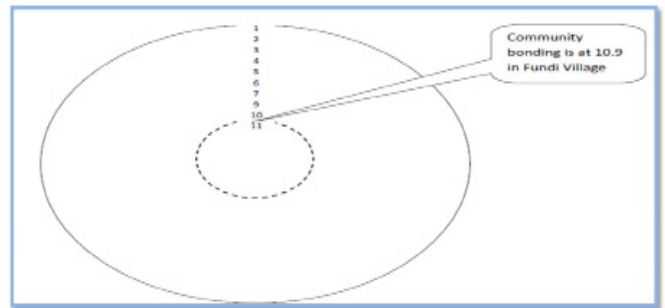


Figure 9: Community Bonding, Fundi village

Mwahimba Village (Urban)

The P-Index has been arranged in the order of their highest priority as shown in Figure 10 below.

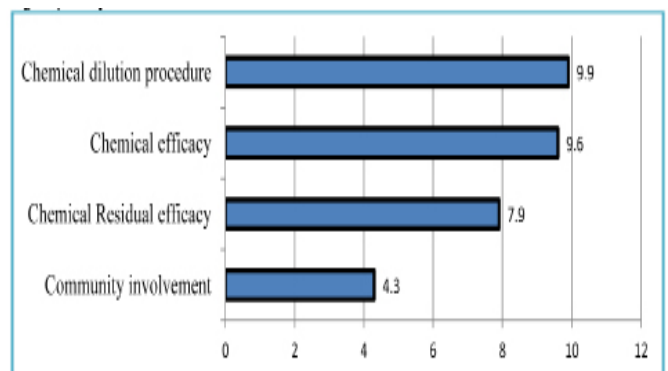


Figure 10: P-Index for Mwahimba village

According to Mwahimba village, items of highest priority as far as IRS is concerned were residual effect and chemical efficacy. On the other hand, the least priority was courtesy. The reasons behind such prioritization were extracted from FGD noted through quotes. The first reason was concerning residual effect which was rated poorly by the community. This was indicated by all the six FGDs who pointed out that the chemical lasted for only one to three weeks. This view was highlighted in the following comments: "I do not believe that the chemical works because the mosquitoes increased. I would have loved if they sprayed in the evening when mosquitoes shift from the bush into houses". -FGD female more than 45 years of age. "Bed nets are a good thing. You sleep under it for a long period unlike this chemical is just a waste of money and our time. The government should buy us mosquito nets". - FGDs male 16-24 and 25 to 44 years old. The participants also noted that the sprayers were too young to be entering their bedrooms. This was evidenced by the following: "The boys and girls sent to spray our houses were too young to be entering our bed rooms, we need older people,"-FGD male 45 years and above. "...Had it been I did not know anyone from the sprayers team I wouldn't have accepted them to spray my house because they were too young." -FGD male 45 years old and above.

On dilution, almost all groups indicated that they did not know whether dilution was being done correctly or not. "They were diluting chemicals in our presence one sachet was mixed with water in a pumping machine". On spraying outdoors, participants agreed with what people in the rural area said that there is need to spray outdoor where mosquitoes breed. On community involvement people in the urban areas preferred spraying their houses themselves. This was evidence in the following quote: "Spraying should be done by the owners of houses. The government should only provide chemicals and equipment. If we

can spray our own houses the work can be done more proper because we cannot cheat ourselves?”-FGDs male and Females 25 – 44 years of age. On quality of service, the urban participants thought sprayers did a good job and they were happy with sprayers’ politeness when approaching a household. For leaders, the results of the C-index are shown in Figure 11 below.

C-Index community Leaders Mwachimba

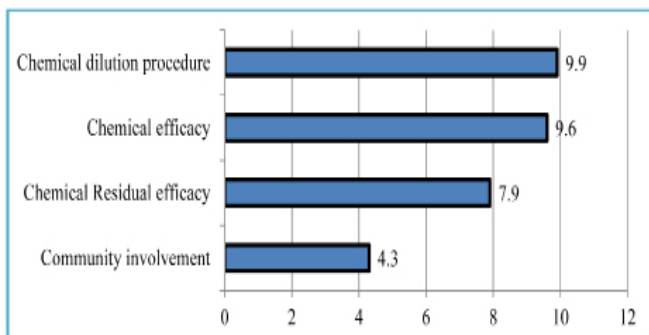


Figure 11: P-Index Community Leaders, Mwachimba

Community leaders in Mwachimba considered dilution of chemical to be a problem of highest priority and community involvement as the least. The leaders thought the chemical was not effective on mosquitoes as quoted: “The chemical in both rounds were very strong in killing mosquitoes and other insects including none insects such as bats, and lizards, but mosquitoes repapered a few days after spraying”. The C-Index results for Mwachimba are shown in Figure 12 below.

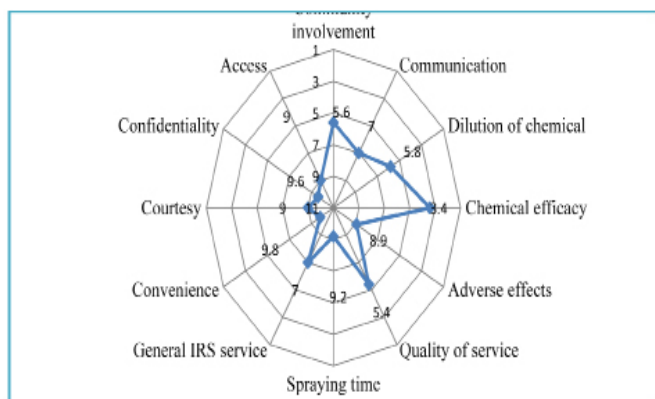


Figure 12: C-Index wheel Mwachimba

Community satisfaction with IRS in Mwachimba Village was at least 68%. Factors underlying community satisfaction included: Communication, minimal adverse effect, good spraying time, IRS service in general, convenience, spray operator courtesy and confidentiality while those leading to dissatisfaction included dilution of chemical, poor efficacy, community involvement and quality of service. For leaders, similar results with community were found (Figure 13).



Figure 13: C-Index wheel for Community Leaders in Mwachimba

Community leaders’ satisfaction level with IRS in Mwachimba Village was at least 53.9%. Factors associated with satisfaction among leaders included community involvement, communication, chemical dilution, efficacy and IRS in general. The levels of satisfaction are summarized in Table 4 below.

Level of community satisfaction with IRS		Level of household satisfied with IRS	
Other members of the community (a)	68%	Other members of the community (n ₁ =48)	30 HH
Community leaders (b)	53.8%	Community leaders (n ₂ =8)	4
Mean = (a+b)/2	60.9%	Overall = [(30+4)/(n ₁ +n ₂)]*100	60.7

Table 3: Satisfaction levels summary from Mwachimba

Overall household satisfaction level with IRS is 60.7% which is the average of 4 out of 7 (HH) and 30 out of 48 (HH) for the community leaders and other members of the community respectively. The overall denominator of households is (n₁ +n₂) = 56. The level of community bonding was lower than that in rural village (Figure 14).

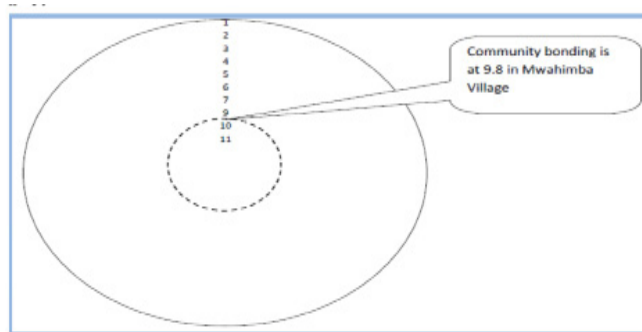


Figure 14: Community Bonding, Mwachimba village

Factors leading to satisfaction and dissatisfaction with IRS programme have been summarized in the Figure 15 below.

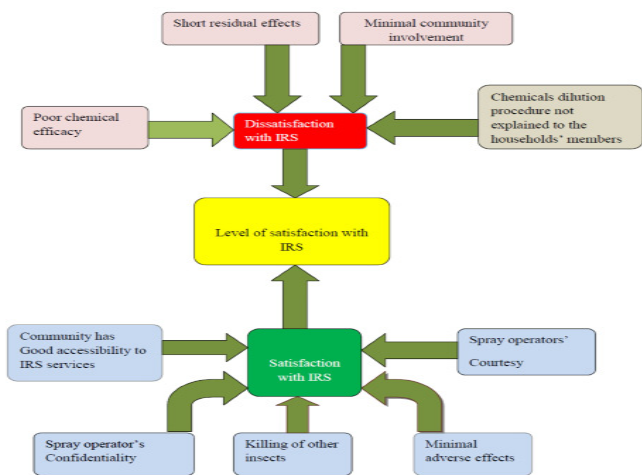


Figure 15: Summary of community satisfaction with IRS

Difference in IRS priority need between rural and urban communities in Karonga.

Figure 16 shows that despite that needs of the rural and urban communities may be similar; their priorities are not the same. What the rural community considers to be priority number one, may not apply to the urban community.

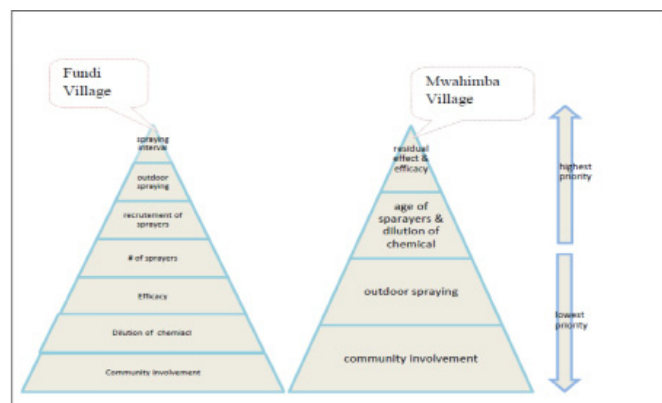


Figure 16: Priority Pyramids for Fundi and Mwachimba

Discussion

Community satisfaction level with IRS

Fundi community (rural) is (68.8%) satisfied with IRS. Community leaders in the same village of are at least 66.5% satisfied with IRS. There is almost no difference between the satisfaction levels of the community leaders and other community members in Fundi. The overall satisfaction in Fundi village is estimated at 68%.When comparing with findings from other studies⁸, the 68% satisfaction level is on the lower side. When the results obtained from Fundi community are compared to those from Mwachimba village, it is clear that people from Mwachimba village are less satisfied (60.9%) than those from Fundi (68%). Both communities are less satisfied with IRS since their satisfaction level is below 95%. Results of Fundi is far from reaching 95% by 26.2% while Mwachimba by 34.1%.

Level of households satisfied with IRS

In Fundi village (rural), overall level of households satisfied with IRS is estimated at 62.5% (30 HH), n=48. Amongst the 62.5% of households satisfied with IRS: 10 households (21%) are satisfied, 5 households (10%) are moderately

satisfied and 15 households (31.25%) are very satisfied. On the other hand, community leaders' level of HH satisfaction is estimated at 84%. Although, more than half of the household are satisfied with IRS, not all households are very satisfied. Results show that 52.6% (16) households, out of the 31households satisfied, are very satisfied with IRS. This means that there is need to improve the services so that the remaining 47.4 % of 31 households in the satisfied shift to the very satisfied category. Community leaders are more satisfied than the other members of the community. According to a study conducted in Mozambique, community leaders involvement contributed to the acceptance and good perception towards IRS¹⁵.This being the case, Karonga District Health Office can take the advantage of community leaders to pursue the goal of combating malaria through IRS in Fundi village. In Mwachimba village (urban), overall level of Household satisfied with IRS is 68.8%, excluding community leaders' results. Amongst the 68.8%, satisfied are: 16.8% (4HH), moderate satisfied: 17.2% (14 HH), and very satisfied: 28.8% (33HH), n = 48. Overall community leaders' level of households satisfied with IRS in Mwachimba village is 52.6%. The overall level for community leaders and other members of the community is estimated at 57.7%. These results mean that in Mwachimba, it is not possible to strongly rely on community leaders in order to achieve IRS since they are the ones that are less satisfied compared to the rest of the community. Community that is not satisfied with health services is likely not to adhere to it⁷. Results of community in this study also indicate less bonding (9.8) in Mwachimba and high bonding (10.9) in Fundi (rural). This explains why community leaders and the rest of the community in Mwachimba were less satisfied.

Factors associated with community satisfaction with IRS

Although the two villages share some factors associated with both satisfaction and dissatisfaction with IRS, some factors are unique to each village. Some of the common factors underlying community dissatisfaction as established in this study are short residual efficacy and poor chemical effect. According to information from Karonga District Hospital, one type of chemical Pyrethroid, has been in use⁶. The use of one chemical in IRS encourages chemical resistance in a mosquito. When resistance develops, efficacy and residual effects are altered¹⁶. As already alluded to, Pyrethroid pauses a persistent fight against malaria since it is prone to development of resistance in a mosquito¹⁷. Based on this evidence, it is possible that resistance has developed in a mosquito that was why poor efficacy and short residual effect were experienced. Another factor established in both villages associated with dissatisfaction with IRS is absence of outdoor spraying. This is in agreement with results obtained in Mozambique where one of the factors associated with IRS dissatisfaction was lack of outdoor spraying¹⁵. But according to other results, outdoor spraying has ever been tried, but failed because of its high cost¹⁶. Considering that a large surface area should be sprayed repeatedly within short interval, this method may not be feasible in Malawi because of its economic status.

Community bonding

The ideal community bonding is 11 but Fundi community's bonding was at 10.9, which was very close to 11. This meant that Fundi community was well bonded;hence the probability of a community project to succeed was high. On the other

hand, Mwachimba village (urban) community's bonding was estimated at 9.8, which were almost 10. This is lower than the community bonding in Fundi but considerably good for an urban setting. Urban areas usually have lower bonding due to mixture of tributes and people staying for short time in one area.

Conclusions

Both rural and urban communities are not satisfied with IRS and these communities share some factors associated with satisfaction. Despite the similar factors the priority needs pyramid show that issues regarded as of highest importance in rural areas are not regarded in the same way in Urban areas and also there was high satisfaction levels in a rural village than in an urban village.

Karonga District Health Office needs to involve the community in the process of spraying by recruiting sprayers from the target area and also explaining the purpose of dilution to community members.

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