



A Survey on Traditional and Modern Prophylactic Methods of Malaria Management in a Resettlement Area in the Southern Lowveld of Zimbabwe

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Malaria is a tropical disease that kills a number of people in tropical areas. At least one million people are killed each year and in Zimbabwe the disease is prevalent among children under five years and the immunosuppressed. In rural areas, people use a number of methods to prevent and cure malaria including traditional and modern methods. A survey was carried out in Mukazi resettlement area, Chiredzi district of Masvingo in Zimbabwe.

A stratified random sampling technique was used to select respondents from six villages giving a sample size 86 respondents. The survey revealed that Mukazi fast track villagers mostly preferred to use Insecticide treated nets (ITN) than other methods to prevent themselves from contracting malaria.

Consistent education of inhabitants on proper use and storage of ITNs that the inhabitants currently use mostly to prevent malaria is required. Chloroquine holders may spearhead the awareness campaigns.

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1. INTRODUCTION

The disease malaria kills over two million people annually, mainly in Africa and mainly children [1,2]. It is believed to kill at least one million people each year, that is, a death in every 30 seconds [3]. It is currently affecting more people in the world than any other disease and prevalence is on the rise [1,4,5]. In Zimbabwe, malaria prevalence is greatest among under fives, pregnant women and people living with HIV and AIDS [6]. In 2002 for example, the Health Management and Information Systems (HMIS) recorded two thousand two hundred malaria deaths and seven hundred and forty thousand clinical malaria cases in Zimbabwe. About 50% of the Zimbabwean population is at risk of contracting malaria each year and therefore resort to traditional medicines [7]. The above statistics could however be marginally below the actual figures since some cases of malaria and deaths especially in rural areas are not reported and or are managed traditionally at home.

The disease is caused by single celled protozoan parasites of the *Plasmodium* species which are transmitted by female *Anopheles mosquitoes*. Control and management of malaria thus requires the control of vector species and or parasites. Chemotherapy, indoor residual spray (IRS) and insecticide treated nets (ITN) have been cited as three most useful tools for control of malaria for several years to come [6,8,9]. The use of these methods needs to be evaluated in the study area.

For several years, malaria had been treated successfully using chloroquine in Zimbabwe. However, recent researches have shown that resistance to chloroquine has emerged and spread widely. In 2004, a new malaria drug policy was launched and chloroquine holders had not been trained on the new drug policy. This exposes patients to great risk of chloroquine resistance strains [6]. An evaluation of the methods used to manage malaria would enlighten on the progress made on educating chloroquine holders about the new malaria drug policy.

Using IRS and larvicides, Zimbabwe in the 1940s, managed to lower malaria mortality and spread of chloroquine resistance [6]. The uses of these methods are facing challenges due to shortage of equipment, transport and foreign

currency to purchase insecticides. ITN statistically has a very low coverage below 5% [6]. The current unfavourable macroeconomic climate is also prohibitive to the success of implementation of IRS and ITN although the National Health Revival Plan (NHRP) prioritises these two on vector control [6].

Traditional methods of managing malaria though used secretly are practiced mainly by the rural folk. These could significantly complement the mainline methods especially during this prohibitive macroeconomic climate that has led to enormous brain drain in the health sector. However, there is need to make thorough investigations into the traditional methods and hence evaluate their efficacy.

[10] stressed that SADC ministers vow to promote use of traditional medicines with malaria among other priorities. Traditional medicines have been used in secrecy [10], but now it is time for thorough research and integration of the medicines into the main health delivery system.

In some endemic countries, treatment against malaria is based on the use of traditional medicines [11] or in combination with Western Medicines [12]. These traditional medicines have also played a vital role in pharmacology for instance; artemisinin for combating malaria is derived from a Chinese herb called sweet worm wood [13].

The World Health Organization (WHO) has started to recognise the role played by traditional medicines in its health programmes [4,14] thus it is also high time that the use of these traditional medicines be evaluated and strengthened.

The Government of Zimbabwe has since independence significantly made health care accessible to the majority of the rural people with seventy percent living within five kilometers radius from clinics [6]. However, the recent land reform programme has created new needs for malaria control. People have been moving to and from places of differing endemicity. IRS, ITN and health centres are limited in these areas. As well, provision of health services does not guarantee use of the health services [15]. To this end, both traditional and modern methods of managing malaria need to be evaluated particularly their use in resettled areas. Evaluation of existing approaches would lead to documentation of new methods of managing malaria.

Significant work plans to eradicate malaria are on course globally and locally such as WHO's Millennium Development Goal (MDG) six target eight [5]; National Health Strategy 1997 -2007 and the Roll Back Malaria (RBM): Strategy for Zimbabwe 2001-2007. Despite the above work plans, malaria transmission in Zimbabwe is largely unstable [6]. Despite high knowledge of signs and symptoms (81%) and causes (80%) malaria infection rate, drug resistance and death rates are high and on the rise. Less than five years mortality rate increased from eighty per thousand in 1980 to ninety per thousand in 1995 and to one hundred and twenty five per thousand in 2001 [6]. Such rise in incidence of malaria is attributed to increasing resistance of anopheles mosquitoes to insecticides and progressive resistance of the parasite (*Plasmodium falciparum*) to malaria drugs [11].

2. BRIEF HISTORY, CAUSES, SIGNS AND SYMPTOMS OF MALARIA

Human malaria has been recognised since the earliest period of Man's recorded history [16]. It has been described using a variety of names such as shakes, March, Roman jingle, intermittent fever, argue and chills. These names originated from the signs and symptoms of malaria chronicled below.

The disease is caused by a single celled protozoan parasite of the genus Plasmodium that has a complicated life history [17]. The life cycle involves humans and mosquitoes as vectors. In humans, only sexual reproduction takes place but in mosquitoes both sexual and asexual reproduction takes place. The particular vector of Plasmodium species is the mosquito of genus Anopheles in which only the female is haemophagous. Female *Anopheles species* are thus vectors of plasmodium parasite. In managing malaria, it is therefore important to eradicate *Anopheles species* to disturb the life cycle of the plasmodium species.

Symptoms of malaria include fever, headache, chills, shivering, and loss of appetite, vomiting, general body weakness and joint pains. Such symptoms occur as a result of large quantities of merozoites and their poisons in the blood and liver cells.

The life cycle of malaria is completely known and its eradication seems to be simple [16]. However, two barriers to its eradication are centered on appearance of drug resistant strains and the

discovery that man can become infected by species of simian malaria [16,17]. Basically there are four known Plasmodium species each with its own type of fever. These are *Plasmodium vivax*, *Plasmodium falciparum*, *Plasmodium malariae*, and *Plasmodium orale*. *Plasmodium vivax* has the widest distribution [16] and *Plasmodium falciparum* has the greatest record of resistance in Zimbabwe [6].

2.1 Method of Transmission

For a human being to get infected, the mosquito must feed on infected human host and must ingest both male and female sexual forms (gametocytes) of the plasmodium species. This enables sexual reproduction in human host to continue.

Mosquitoes breed in pools of clear water exposed to sunlight and not in overgrown swamps or flowing rivers. Such suitable conditions necessary for multiplication of *Anopheles species* enhance prevalence of malaria. Little or no rain lowers prevalence of malaria. This scenario explains existence of high seasonal malaria transmission zones in Zimbabwe. Weakened disease resistance due to undernourishment and human bodies that lack immunity aggravate prevalence. Climatic and social factors also contribute to high prevalence of malaria for instance, social disorganization prevent eradication of malaria [16]. Knowledge of the above information can significantly help inhabitants to manage malaria both prophylactically and therapeutically.

2.2 Methods of Managing Malaria

The first and most basic priority in malaria control is to prevent infected individuals from becoming severely ill and dying [2]. The first step in malaria control is to modify the ecological situation so that part of life cycle of the parasite is blocked. Knowledge of the feeding habits of particular Anopheles species is also essential, for instance, *Anopheles dirus* is early biting, exophagy and exophily such that neither IRS nor ITN seem to control them [18].

Another approach in malaria control is to use drugs that damage the parasite while doing minimum harm to the cells of human host, for example, chloroquine. Such drugs have since been used but are facing resistance from parasites. These drugs can be administered either prophylactically or therapeutically.

A third approach is managing and controlling malaria is the eradication of adult haemophagous Anopheles mosquitoes by IRS and ITN. This is regarded as the most cost effective method [6,17].

Elimination of all potential mosquito breeding points such as still waters, roof gutters, ponds, water filled pots, tins and cans may also positively reduce malaria. Such practices have yielded positive results, for example, draining Pontine Marshes near Rome eliminated possibility of Anopheles mosquitoes breeding; and in Malaysia, draining stagnant water effectively reduced malaria [19]. Vectors may also be stopped from breeding by spraying oil with insecticide into water bodies so that larvae suffocate and settling laying mosquitoes get killed. However this method is not eco friendly since untargeted aquatic organisms also get killed.

Biological methods such as the use of fish that feed on larval forms also reduce mosquitoes. Another promising biological method is the culturing of the bacterium called *Bacillus thuringiensis* in water bodies [19]. The bacterium produces a protein coat that is highly toxic to mosquito larvae. However breeding such harmful bacteria in water bodies may also be harmful to other organisms that depend on water.

Measures should be taken to limit human mosquito contact for people living in endemic areas. This is done through the use of ITN, IRS, repellants and mosquito coils which burn over night to release insecticides which kill or deter mosquitoes. Traditional remedies using locally available plant materials have also been in use either to prevent mosquito bites or to treat malaria.

Although the literature mentions a lot of methods in managing malaria, the use of ITN, IRS, mosquito coils, and repellants; modern drugs and traditional remedies are evaluated in this research.

2.3 Related Studies

Several related studies have been carried out with interesting results. A research entitled 'Role of traditional healers in the management of severe malaria among children below the age of five years: The case of Kilosa and Handeni districts in Tanzania' highlighted the roles played by traditional healers and caregivers in the

management of malaria [15]. The research also revealed that home management involves sponging and washing in warm water. The research also documented five traditional stages of managing severe malaria. The research also recorded a high score of knowledge and recognition of malaria. The five stages were i) reception of the mother of the sick child and the child; ii) bathing or sponging the child to lower the high temperature; iii) diagnosis (divination or reading the Quoran and iv) treatment and v) prevention of *degedege* (convulsions).

While the research by [4] targeted traditional healers and care givers, this research also targets general elderly people (55 plus years), faith healers and middle-aged people (20-54 years) apart from traditional healers. Their study also included management of malaria cases particularly for children less than five years including evaluation of methods used to prevent and treat malaria and revealed improved involvement of traditional healers in managing severe cases of malaria in Tanzania.

A snow balling technique was used to select traditional healers and faith healers for interviews as in [4]. In addition interview guides were used in this study.

A related phytotherapy [20] documented traditional plants with antiplasmodial compounds in already identified plants. However, this research identifies traditional plants with suspected antiplasmodial compounds as well as plants with anti mosquito compounds so that they will be further screened or tested.

A study on ethnoveterinary medicine examined community based solutions to treatment of animal diseases and documented traditional remedies for treatment of fourteen prevalent diseases [21]. Closely related to the current study is the idea of methods of preparation and administration of the traditional remedies identified.

Another comprehensive study [22] examined traditional malaria management as well as use of health facilities and is in line with the current study. Computer generated random numbers were used to sample out respondents.

It is against this background that current modern and traditional methods of managing malaria are evaluated. The study thus aims at evaluating the use of traditional and modern prophylactic and

therapeutic malaria management practices in Zimbabwe's newly resettled areas taking Mukazi resettlement area in Chiredzi district as a case study.

The objectives of the study are as follows:

- a) To evaluate Mukazi inhabitants' knowledge of causes, signs and symptoms of malaria.
- b) To identify commonly used traditional and modern prophylactic and therapeutic ways of managing malaria in Mukazi area.
- c) To document traditional remedies, their methods of preparation, administration and side effects.
- d) To establish trends in the use of particular methods.

Due to high incidence of malaria, there is an urgent need to evaluate current methods of preventing and treating malaria so that new approaches and drugs to reduce incidences and death rates are invented.

2.4 Significance of the Study

- a) The ministry of Health and child welfare recognises the role played by traditional medicines. In light of this, results from this study would make the basis for further research on malaria combating compounds.
- b) Traditional herbs identified may be screened for their anti malaria or anti mosquito efficacy. This could lead to the discovery of new anti mosquito and anti malaria drugs that will help to reduce incidence, death rate and resistance rate. Such discovery will significantly contribute to the achievement of the Millennium Development Goal number 6 target 8.
- c) This study will partially evaluate the "Role Back Malaria: Strategy for Zimbabwe 2001-2007" programme especially on IRS and ITN coverage in rural areas.

3. MATERIALS AND METHODS

3.1 Study Area

The study focused on Mukazi fast track resettlement area situated in Chiredzi district at the borderline with Bikita district. Chiredzi is a high and seasonal malaria transmission area according to the Ministry of Health and Child Welfare's new malaria stratification of 2002. The area is made up of six villages. It has neither

clinics nor hospitals except services of six community village health workers one in each village. The nearest clinic is over thirty kilometers away and villagers face problems such as health facilities and transport.

The resettlement is planned and each homestead has a stand number that was used for random sampling. The area has an approximate population of seven hundred families. These inhabitants are migratory especially in search of essential services such as clinics, transport and shops. They are more prone to mosquito bites since they usually sleep on verandas to access transport.

The inhabitants also have varying geographical origin and cultural backgrounds such that they provided the research with varied opinions on ways of traditionally managing malaria.

The investigation targeted traditional healers, herbalists, faith healers, elderly people (55 years plus) and middle-aged people (20-54 years). These are family leaders who were expected to have sound knowledge on managing malaria cases at some point and time in their lives. Such people also have great influences in decision making when disease problems arise.

Chloroquine holders who usually work hand in hand with the community and health workers were also targeted to provide information about measures being taken to deal with malaria problems either prophylactically or therapeutically.

3.2 Methodology

A stratified random sampling technique was used to select respondents. Each of the six villages was regarded as a stratum coded V1 to V6. From each of the six strata, four sub strata were sampled and coded FH (faith healers), THH (traditional healers and herbalists), MA (middle aged people) and EP (elderly people). The stratification took into account the inhabitants' occupation, age and family roles. Mostly, family members who were believed to have knowledge about malaria management were targeted.

A total of 86 general inhabitants were sampled for the interview taking into account the general population of each substratum. Six faith healers and eight traditional healers and herbalists were sampled using a snow balling sampling technique. The village community workers in the

villages were asked to nominate one traditional or faith healer. Nominated individuals went on to nominate another until the required sample was reached. Of the eight sampled from THH, two are famous herbalists and six are well known traditional healers. Stand numbers for substrata FH and THH were noted to avoid reselection.

The largest sample of forty-eight respondents was drawn from substratum MA since it constituted the largest population. Eight respondents from each village were selected at the village chairmen’s residence. Stand numbers for residence were used for selection. Random numbers from the scientific calculator were punched and the last two digits matched with stand numbers and inhabitants with matching stand numbers were considered until samples of eight from each village were obtained. Stand numbers for community based chloroquine holders and for numbers of FH and THH already noted were not considered even if they are matched.

The above sampling technique was also done to obtain EP members. A total of twenty-four EP members were selected four from each village.

Qualitative approaches were used to explore and describe malaria management trends. This was done through the use of interview guides (questionnaires) with contents shown in the appendix section of this project.

Two different interview guides (questionnaires) were prepared and administered to obtain information from two different groups of inhabitants.

The first guide targeted the general inhabitants of the area (FH, THH, MA and EP) members. This interview guide helped to gather information about knowledge of signs and symptoms of malaria. It also assisted in describing the use of

traditional practices in managing malaria as well as establishing trends in managing malaria. Knowledge of methods of herbal preparation, administration and the side effects of certain management practices were also gathered using this questionnaire.

The second interview guide targeted community based chloroquine holders. This document helped in establishing methods of malaria management encouraged in the area.

The link among inhabitants, community based chloroquine holders and health officers in managing malaria were also established using this questionnaire.

Quantitative data was presented in form of tables and bar charts. This made comparison of established trends and methods easy. A chi square test at five percent significance level was used to test the significance of the results obtained. It was used to establish whether there is a relationship between age or occupation and use of particular management method.

4. RESULTS

An average of eighty three percent of the interviewed population indicated correct knowledge of causes of malaria and eighty six percent indicated correct knowledge of signs and symptoms of malaria. Such high figures indicate that inhabitants are very conversant with the disease malaria. All the six villages recorded high percentages of knowledge of signs and symptoms and causes of malaria (Table 1).

The survey revealed that Mukazi fast track villagers mostly preferred to use ITN to prevent themselves from contracting malaria (Table 2). Thirteen percent of the population preferred to use traditional remedies.

Table 1. People’s conception of causes, signs and symptoms of malaria

| Village | Conception of causes of malaria | | Knowledge of signs and symptoms | |
|---------|---------------------------------|------------|---------------------------------|------------|
| | Number of responses | Percentage | Number of families | Percentage |
| 1 | 12 | 85 | 10 | 71 |
| 2 | 11 | 78.5 | 12 | 85 |
| 3 | 10 | 71 | 14 | 100 |
| 4 | 13 | 92.9 | 13 | 92.9 |
| 5 | 11 | 78.5 | 11 | 78.5 |
| 6 | 12 | 85 | 12 | 85 |
| Overall | 70 | 83 | 72 | 86 |

Table 2. Prophylactic management of malaria by preference

| Method | Number of first preference | | | | | Percentage |
|----------------------------------|----------------------------|-----|----|----|-------|------------|
| | FH | THH | EP | MA | Total | |
| Insecticide treated nets (ITN) | 2 | 2 | 14 | 40 | 58 | 67 |
| Traditional methods | 2 | 4 | 2 | 3 | 11 | 13 |
| Insecticide residual spray (IRS) | 1 | 0 | 5 | 1 | 8 | 9 |
| Prophylactic tablets | 1 | 0 | 0 | 3 | 4 | 5 |
| Mosquito coils | 0 | 1 | 1 | 1 | 3 | 3 |
| Repellant jellies | 0 | 0 | 2 | 0 | 2 | 2 |

Most inhabitants reasoned that they preferred ITNs mostly because they are cheap and readily available. Each home has received a donation of at least three bed nets from UNICEF. Fifteen percent of those who preferred ITNs reasoned that nets cover the whole body at night and inhabitants get protected at night. Very few people preferred to use other methods (IRS 9%), prophylactic tablets (5%), mosquito coils (3%) and repellent jellies (2%). The major reason for low use of these methods was that the inhabitants could not afford to buy them. Side effects included respiratory problems (mosquito coils) and allergies (IRS).

Results from this survey show that the inhabitants mostly follow ten trends in managing malaria prophylactically (Table 3). The use of ITN has significant high frequency (47%) when compared with other nine trends. It was noted that middle-aged people (MA) mostly use ITNs only. Eleven people (13%) indicated that they combine ITN and traditional remedies. It was evident that out of the ten remedies documented, five of them involve use of ITNs. The use of IRS as a method of managing malaria is very low (7% IRS only and 10% ITNs and IRS) although it is one of the most recommended methods.

The survey has revealed eight traditional prophylactic remedies (Table 4). Six out of the eight remedies involved use of plant species and

two out of eight, animal derived remains. Most of the plant species have odour or aroma which either deter or kill mosquitoes. Other methods involve burning to produce smoke similar to the modern methods of using mosquito coils which glow throughout the night to deter mosquitoes.

Zimbani has the highest number of family users (10 families: 12%). It has also been noted that most families use at least three remedies.

The survey revealed ten major trends in therapeutic management of malaria. (Table 5) Visiting chloroquine holders only has the highest frequency of thirty-eight families (44%). The major reason for this high frequency is that the chloroquine holders are very close to them. Clinics are very far away. Village 4 which has the shortest distance to Gawa Clinic has highest number of people who preferred to visit clinics. Middle aged inhabitants have the highest number of inhabitants who preferred to visit chloroquine holders.

Treating malaria patients using malaria tablets significantly surpasses other methods (75%). Nineteen families (22%) combine the use of traditional practices and modern methods. The major reason for visiting traditional healers and faith healers first was to get cleansed of evil spirits before they take malaria course.

Table 3. Rank order list of trends in managing malaria prophylactically

| Method | Number of families | | | | Total | Percentage |
|-----------------------------|--------------------|-----|----|----|-------|------------|
| | FH | THH | EP | MA | | |
| Insecticide treated nets | 0 | 0 | 5 | 35 | 40 | 47 |
| ITN and traditional methods | 2 | 6 | 2 | 1 | 11 | 13 |
| Traditional methods only | 2 | 2 | 4 | 2 | 10 | 12 |
| ITN and IRS | 1 | 0 | 5 | 3 | 9 | 10 |
| IRS only | 0 | 0 | 5 | 1 | 6 | 7 |
| ITN and tablets | 1 | 0 | 0 | 2 | 3 | 3 |
| Prophylactic tablets only | 0 | 0 | 0 | 2 | 2 | 2 |
| ITN and repellent jellies | 0 | 0 | 1 | 1 | 2 | 2 |
| only Coils only | 0 | 0 | 1 | 1 | 2 | 2 |
| Repellant jellies | 0 | 0 | 1 | 0 | 1 | 1 |

Table 4. Rank order list showing traditional prophylactic remedies

| Remedy | Part used | Method of preparation | Method of administration | Side effects | No. of families | Percentage |
|--|-----------------------------|---|--|--|-----------------|------------|
| 1. Zimbani (<i>Lippia javanica</i>) | Fresh leaves | Cut fresh leaves | Hang leaves in orange sacks on bed room windows | _____ | 10 | 12 |
| 2. Cow dung | Dry cow dung | Dung is placed in a metal place with glowing charcoal | Cow dung is burnt and glows to produce smoke. Placed in bed room to deter mosquitoes. | Smoke produced contain carbon monoxide which lead to respiratory complications | 9 | 10 |
| 3. Horsemint (chipunganyunyu) | Fresh leaves | Pinch a boom or two crush by rubbing with hands | Apply by rubbing onto exposed surfaces of the skin. | _____ | 8 | 9 |
| 4. Pyrethrum Plant (...) | Flowers or dried stem parts | Pinch a boom or two crush by rubbing with hands | Apply by rubbing onto exposed surfaces of the skin. | _____ | 6 | 7 |
| 5. Elephant dung | Dry elephant dung | Dung is placed in a metal place/piece of clay pot | Prepared remedy is placed in the bedroom at dusk | Smoke produced is harmful to users | 5 | 6 |
| 6. Mutovhoti (<i>Spirostachys africana</i> Sond) | Stem | Pieces of dry wood are to glow and produce smoke | The glowing pieces of wood are placed into the bedroom at dusk to deter mosquitoes. Users later on enter the room. | Smoke is harmful and can choke users | 5 | 6 |
| 7. Mbanda (<i>Chenopodium ambrosioides</i>) | Leaves | Leaves are cut and placed in porous orange/potato sack | The preparation is hung in the bedroom to deter mosquitoes | _____ | 3 | 3 |
| 8. Vertiver Grass (<i>Chrysopogon nigratana</i>) | Roots | Vertiver is planted around the yard. Roots are used to make window screens. | Its roots emit aroma which deter mosquitoes. The screens deter mosquitoes. | _____ | 2 | 2 |

Table 5. Rank order list of trends in therapeutic management of malaria

| Method | Number of families by substratum | | | | | |
|---|----------------------------------|-----|----|----|-------|----|
| | FH | THH | EP | MA | Total | % |
| 1. Visiting chloroquine holders only | 2 | 1 | 6 | 29 | 38 | 44 |
| 2. Visiting rural health centres only (clinics) | 0 | 1 | 2 | 7 | 10 | 12 |
| 3. Visiting traditional healers and chloroquine holders | 0 | 2 | 5 | 1 | 8 | 9 |
| 4. Visiting faith healers only | 2 | 0 | 2 | 3 | 7 | 8 |
| 5. Visiting chloroquine holders and rural clinics | 1 | 0 | 1 | 4 | 6 | 7 |
| 6. Visiting faith healers and chloroquine holders | 1 | 0 | 3 | 1 | 5 | 6 |
| 7. Visiting herbalists only | 0 | 1 | 2 | 1 | 4 | 5 |
| 8. Visiting traditional healers and clinics | 0 | 1 | 2 | 1 | 4 | 5 |
| 9. Visiting faith healers and clinics | 0 | 0 | 1 | 1 | 2 | 2 |
| 10. Visiting traditional healers only | 0 | 2 | 0 | 0 | 2 | 2 |

The survey has revealed that six families (7%) visit traditional healers or herbalists only. These reasoned that tablets have bitter taste and smell. They also reasoned that malaria courses will upset their ancestral spirits such that they may become critically ill if they use malaria tablets.

A small proportion of the population has shown that the inhabitants use traditional remedies for treating malaria. Seven traditional remedies for treating malaria have been documented (Table 6). The use of granite stone has the highest percentage use (12%). This practice is common among faith healers, Christians and some traditional healers.

Although Manunu has the lowest percentage use (2%), it has two major uses and effects (Table 6). It has also been noted that, some inhabitants take Manunu plant as their first line of treatment before the patient is transferred to health centers. The medicine is believed to treat mild cases of malaria and severe cases are referred to hospitals or clinics.

It has been noted that, six out of the seven remedies involve the use of plant medicines and only one method involve cooling by evaporation.

Moringa oleifera, which is well known for treating a wide range of human diseases, is used by eight percent of the population. It was interesting to note that some inhabitants planted this herbal tree at their homesteads for easy self treatment.

The overall results obtained show that most people prefer to use modern methods of managing malaria both prophylactically and therapeutically (Table 7, Fig. 1). Seventy- six percent of those interviewed preferred to use modern methods exclusively to prevent malaria and six two percent use modern method therapeutically.

A smaller proportion of the population exclusively uses traditional methods (11% prophylactically and 15% therapeutically). A slightly higher proportion combines modern and traditional methods (Table 7, Fig. 1). However, there was a significant association between age group or occupation and the use of a particular method ($p < 0,001$ prophylactically and $p < 0,05$ therapeutically).

There has been significant evidence to show that generally stakeholders in managing malaria are much concerned about the disease malaria. This is shown by the number of scheduled meetings among stakeholders to discuss the disease malaria (Table 8). Chloroquine holders hold meetings once every month with health officers. They also meet the general public once in every two months. Among themselves, chloroquine holders meet four times per year.

Although the health staff constantly inform patients about malaria, they hold formal meetings with the public once in every six months and four meetings among themselves. There was no evidence of any formal meetings among inhabitants to discuss the problem of malaria.

Malaria awareness posters are evident at all clinics and hospitals. However, no such posters could be seen at villagers' public places. Since inhabitants rarely visit clinics or hospitals there is need to provide posters to inhabitants' public places such as boreholes and dip tanks.

5. DISCUSSION

Research findings indicate that there is generally a high conception of the causes, signs and symptoms of malaria. This is indicated by high percentages of correct identification of the

causes of malaria (83%) and signs and symptoms (86%)(Table 4). Only 17% of those interviewed could not correctly state the causes of malaria and 14% could not state the signs and symptoms of malaria. The most common signs stated were headache, high body temperature, sweating, fever and nausea. The above results are in line with other previous research findings in Zimbabwe [11] and in Tanzania. [15] In fact, malaria conception rate seem to have marginally increased in the study area (from a national rate of 80% on causes to 83%) and (from a national rate of 81% to 86% on signs and symptoms of malaria).

Table 6. Therapeutic management of malaria (Traditional remedies)

| Remedy | Part used | Percentage use | Method of preparation | Method of administration | Effect on patient |
|---------------------------------------|-------------------|----------------|---|---|---------------------------------------|
| 1. Baobab (<i>Adansia digitata</i>) | Roots | 5% | Roots are crushed and boiled with goat milk | Patient is made to drink the preparation. | |
| 2. Hot pepper | Fruits | 7% | One to two hot pepper taken | Patient swallows the fruits (1or2). | Stops nausea |
| 3. Muranga | Barks | 3% | Root barks are crushed | Patient chews and swallows the barks. | |
| 4. Manunu plant | Root barks | 2% | Root barks are crushed and boiled with goat milk | Patient drinks the mixture twice a day before visiting the clinic | Induces vomiting (kurutsa nduru) |
| 5. Manunu plant | Root bark | 2% | Bark is crushed | The medicine is inserted into the patient's anus | Stops diarrhoea in malaria patients |
| 6. Granite stone (mbango) | Stone | 12% | Stone is heated on fire till it is red hot | Red hot stone is put into cold water and boils. Patient gets covered together with the stone (<i>kufukira</i>). | Causes the patient to sweat profusely |
| 7. <i>Moringa oleifera</i> | Bark, roots, stem | 8% | The parts are ground separately into powdery form | Patient orally takes the powder with food or in drink | |

Table 7. Overall method use in preventing and treating malaria by substratum (Summary table)

| Method | Number of users and percentage use | | | | | | | | | | | |
|-------------------------|------------------------------------|-----|----|----|-------|----|------------------------|-----|----|----|-------|----|
| | Prophylactic management | | | | | | Therapeutic management | | | | | |
| | FH | THH | EP | MA | Total | % | FH | THH | EP | MA | Total | % |
| Exclusively modern | 2 | 0 | 18 | 45 | 65 | 76 | 2 | 2 | 9 | 40 | 53 | 62 |
| Exclusively traditional | 2 | 2 | 4 | 2 | 10 | 11 | 2 | 3 | 4 | 4 | 13 | 15 |
| Modern and traditional | 2 | 6 | 2 | 1 | 11 | 13 | 2 | 3 | 11 | 4 | 20 | 23 |

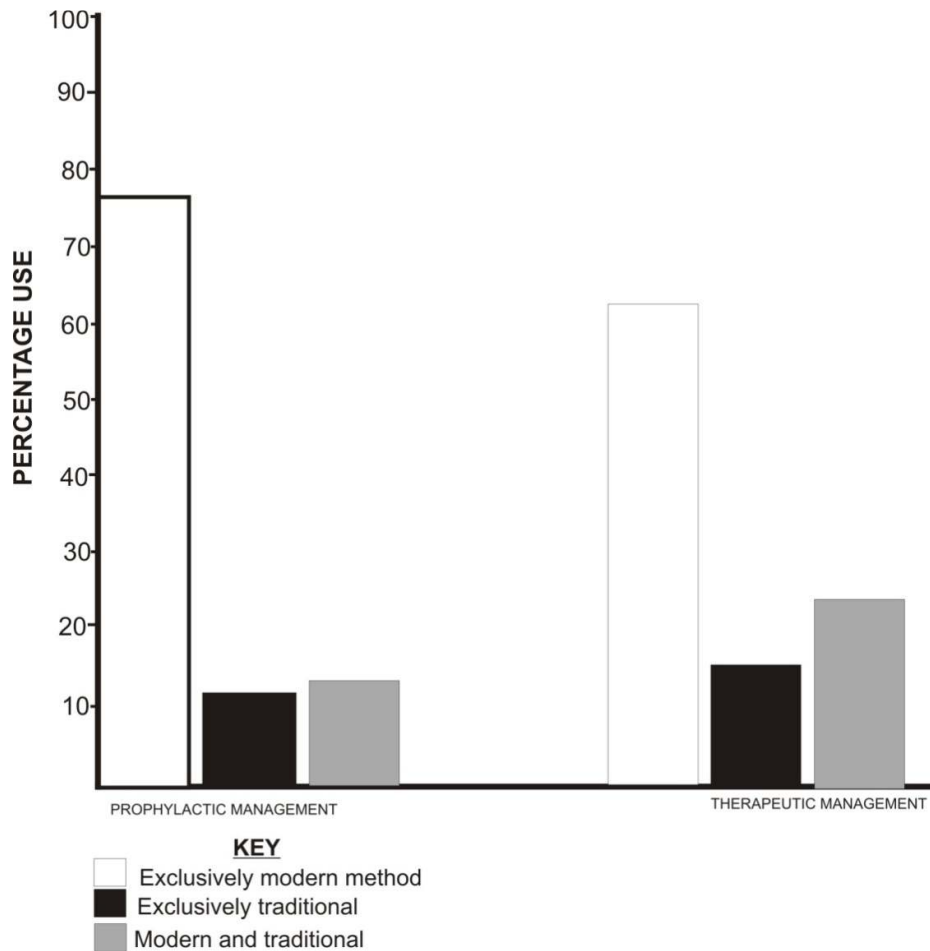


Fig. 1. Bar chart summarizing overall method use by percentage

Table 8. Programmed meetings to be held among stakeholders per annum

| Stakeholders | Number of meetings per annum |
|---|------------------------------|
| Chloroquine holders with the general public | 6 |
| Among chloroquine holders | 4 |
| Chloroquine holders with health officers | 12 |
| Health officers with the general public | 2 |
| Among health officers | 4 |

Stakeholders in malaria control in the area attribute this to collective action against malaria. There is evidence of collaboration among stakeholders as indicated by the number of meetings held by stakeholders annually (Table 5).

The study has shown that, inhabitants in the study area generally use either traditional methods or modern methods or both to manage malaria prophylactically. Twelve percent of those interviewed indicated that they exclusively use

traditional methods to deter themselves from mosquito bites. A slightly higher percentage (13%) of those interviewed indicate that they use modern and traditional methods in combination (Table 4). Majority (76%) indicated that they exclusively use modern methods to manage malaria prophylactically. It has been noted that, proportionally middle-aged headed families constitute the largest proportion of those who exclusively use modern methods. On the other hand, old aged and traditional healers constitute the largest proportion of those who use

traditional methods only and or the methods in combination. These have wide knowledge of traditional herbs.

Although ten trends in managing malaria prophylactically have been documented (Table 2) use of insecticide treated nets only has the highest frequency (40). A significant number of the inhabitants use this method only. Families headed by middle-aged people also proportionally constitute the largest percentage. Insecticide treated nets are also being widely used in combination with other methods.

The survey has also revealed that insecticide treated nets coverage in the study area has significantly improved from a national low coverage of below 5% reported in [6] to 100% revealed in this study. The increase is attributed to a recent donation from UNICEF of at least three treated bed nets to each household. Although ITN coverage in the study area is 100%, it has been noted that not all people use the available nets to deter themselves from mosquitoes' bites (Table 2). Such findings are in line with previous observations reported by previous researchers [15]. General misuse of the nets was observed in the study area. Some nets were used for trapping fish and storing cotton. Such practices expose the nets to physical damage. Using the nets to trap fish also washes the insecticide off the nets and hence reducing the five-year insecticide active span. This exposes inhabitants to mosquito bites and hence contacting malaria.

Inhabitants rarely use mosquito coils, repellent jellies and prophylactic tablets in managing malaria prophylactically (Table 3). Inhabitants complained that they couldn't afford these. Furthermore some inhabitants complained of side effects caused by these options, for example, respiratory complications and ash residue from mosquito coils, greasy bed linen that easily catches dirt due to repellent jellies. Prophylactic tablets are not readily available since chloroquine holders do not dispense them.

Although IRS has been cited as one of the most three useful tools for malaria control together with ITN and chemotherapy [6], it is rarely used in the study area. IRS which used to be provided by the Ministry of Health and Child Welfare has not been publicly provided since 2002. The environmental health technician cited lack of foreign funding to the programme. This has

significantly contributed to its low percentage use (8%). IRS coverage has marginally declined.

Inhabitants in the study area have shown to use traditional remedies rarely. Of the eight traditional prophylactic remedies documented, six of them involve use of plant species and two involve use of animal remains. Most of the remedies involve fumigating using smoke. This burning process is similar to modern use of mosquito coils. Fumigating using elephant dung has been previously reported [15]. However, in the previous research fumigating using dung is done to treat severe malaria cases whereas in the present study it is done for preventing mosquito bites.

Results from this survey also indicate that the inhabitants in the study area generally use traditional methods, modern and or the methods in combination to manage malaria cases. The use of modern methods only is higher than the use of traditional methods only and the use of the methods in combination. Sixty two percent of those interviewed exclusively use modern methods and only fifteen percent use exclusively traditional methods. It has been noted that a sizeable proportion (23%) uses the methods in combination in dealing with malaria cases. Visiting chloroquine holders only significantly surpasses other methods. Middle-aged people proportionally have the largest percentage of those who visit chloroquine holders for malaria treatment. The elderly people, faith and traditional healers proportionally constitute the largest percentage of those who exclusively use traditional remedies.

Seven traditional therapeutic remedies have been documented (Table 6). Their effects on patients include stopping nausea; induce vomiting, stopping diarrhoea and causing sweating which eventually cools down the body (cooling by evaporation). There is evidence to support that some inhabitants use both modern and traditional medicines to combat malaria. Twenty-two percent of those interviewed revealed that they use the methods in combination. Mostly, inhabitants who use both methods start by self treatment at home using traditional drugs. If the condition does not improve, they seek help from traditional healers or some consult the chloroquine holders for further treatment. Manunu plant, for example; has been reported to be used as a first line drug at home before the patient is referred to the clinic or community based chloroquine holders.

The following referral trends are a common practice in the area. Traditional home treatment to chloroquine holders; traditional healers to chloroquine holders; faith healers to chloroquine holders; faith or traditional healers directly to health centres. Similar referral systems have been documented previously [15,23].

Chloroquine holders also refer severe cases to rural health centres or major district hospitals. It has been noted that before the introduction of the current drug policy, chloroquine holders used to refer every patient to a nearby rural health centre for further treatment with sulphadoxines-pyrimethamines. However, after the introduction of the current drug policy, referrals have declined since the patients now get a complete course to eradicate chloroquine resistant strains.

Collaboration among stakeholders in the study area is very high. This is shown by the high frequency of meetings scheduled per annum among stakeholders. Such meetings are believed to equip home-based chloroquine holders with basic knowledge about malaria treatment. All chloroquine holders interviewed were conversant with the new drug policy as stated below:

First line treatment: Chloroquine + sulphadoxines-pyrimethamines.

Second line treatment: Oral quinine for seven days.

Third line treatment for severe malaria: Parenteral quinine.

6. CONCLUSIONS AND RECOMMENDATIONS

Overall the results indicate that inhabitants in the study area are conversant with the disease malaria. The high knowledge contributes significantly to their use of either traditional, modern or both methods to combat malaria. The choice of which method to use depends mainly on either age or occupation.

Although collaboration among stakeholders is very high, there is need for consistent education of inhabitants on proper use and storage of insecticide treated nets which the inhabitants currently use mostly to prevent malaria. Chloroquine holders may spearhead the awareness campaigns.

The effectiveness and effects of ITN in preventing malaria in the study area need to be further studied. The efficacy of selected

traditional remedies in this research also needs to be tested.

CONSENT

All authors declare that written informed consent was obtained from the participants (informants) for publication of this paper.

ETHICAL APPROVAL

All authors hereby declare that all questionnaires have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. WHO. WHO policy recommendation: Seasonal malaria chemoprevention (SMC) for Plasmodium falciparum malaria control in highly seasonal transmission areas of the Sahel sub-region in Africa; 2012.
2. Mooney L, Bate R. ed Environmental Health third world problems, first world pre-occupations butter worth- Heine Mann. Oxford; 1999.
3. Greenwood B, Mutambingwa T. Malaria. Nature. 2002;415:670-672.
4. Makundi EA, Mboera LEG, Malebo HM, Kitua A. Priority setting on Malaria interventions in Tanzania: Strategies and challenges against the intolerable burden. The American Society of Tropical Medicine and Hygiene. 2007;77(6).
5. WHO. Health in the millennium development goals: Millennium development goal, targets and indicators related to health; 2004.
6. Midzi S, Tevedzerai V, Mudyiradima R, Chinhanga S, Netsa M, Mugove AT, Charimari L, Pasipamire J, Mutambu S, Kibassa C, Ngwenya N, Gausi K, Banda J, Mukelabai K, O'Connell T, Root G. Zimbabwe roll back malaria consultative mission (reaping): Essential actions to support the attainment of the Abuja targets; 2004.
7. Ngarivhume T, van't Klooster CIEA, de Jong JTVM, Van der Westhuizen JH.

- Medicinal plants used by traditional healers for the treatment of malaria in the Chipinge district in Zimbabwe. *Journal of Ethnopharmacology*. 2015;159:224–237.
8. WHO. Insecticide-treated nets to reduce the risk of malaria in pregnant women; 2016.
 9. Scandurra L, Acosta A, Koenker H, Daniel Musoke Kibuuka DM, Steven Harvey S. It is about how the net looks: A qualitative study of perceptions and practices related to mosquito net care and repair in two districts in Eastern Uganda. *Malaria Journal*. 2014;13:504.
 10. The Herald. Africa: SADC ministers vow to promote traditional medicine. 2005;4.
 11. Zirih GN, Mambu L, Guede F, Guina B, Bodo B, Greiller P. *In vitro* antiplasmodial activity and cytotoxicity of 33 West Africa plants used for treatment of malaria. *J. Ethnopharmacol*. 2005;98:281-285.
 12. LeGrand A, Wondergem PA. Traditional healers in Tanzania: The treatment of malaria with plant remedies. Botanical Museum, Harvard University USA; 1990.
 13. Miller LH, Su X. Artemisinin: Discovery from the Chinese herbal garden. *Cell*. 2011;146(6):855-858.
 14. Boily Y, Van Puyvelde L. Screening of medicinal plants of Rwanda (Central Africa) for antimicrobial activity. *Journal of Ethnopharmacology*. 1986;16:1–13.
 15. Makundi EA, Malebo HM, Mhame P, Kitua A, Warsame M. Role of traditional in the management of severe malaria among children below 5 years of age: The case of Kilos and Handeni Districts, Tanzania *Malaria Journal*. 2006;5:58.
 16. Smyth JD. Introduction to animal parasitology. Cambridge University Press Cambridge; 1994.
 17. Burnet SM, White DO. Natural history of infectious diseases. Cambridge University Press, Cambridge; 1978.
 18. Erhart A, Ngo TD, Phan KV, Ta TT, Overmier CV, Speybroeck N, Obsormier V, Le XH, Le KT, Coosemans M. Epidemiology of forest malaria in central Vietnam: A large scale cross sectional survey. *Malaria Journal*. 2005;4: 58.
 19. Maclean D, Jones B. Introduction to human and social biology. John Murray London; 2004.
 20. Rasoanaivo P, Ramani TD, Rafatro H, Rakotondramanana D, Rabisoana B, Rakotozuy A, Ratsimamanga – Urverg S, Labaied M, Greiller P, Allorge L, Mambu L. *Phytotherapy Research*. 2004;18(9):742-49.
 21. Matekaire T, Bwakura T. Ethno veterinary medicine: A potential alternative to orthodox animal health delivery In Zimbabwe. *Intern J Applied Research of Veterinary Medicine*. 2004;2(4):269-273.
 22. Malik EM, Hanafi K, Ali SH, Ahmed ES, Mohamed KA. Treatment seeking behavior for malaria in Children under five years of age: Implications for home management in rural areas with high seasonal transmission in Sudan. *Malaria Journal*. 2006;5:60.
 23. WHO. Malaria Control today: Current WHO Recommendation. RBM Department WHO. Geneva; 2005.

APPENDIX

Interview Guide for Inhabitants

Introduction

This survey is meant to solicit information on different methods used to manage Malaria in rural Zimbabwe. Your selfless cooperation will guarantee the success of this project. This will in turn help your community and Zimbabwe at large. The information obtained will be treated with confidentiality and only used for academic purposes.

Section A: Personal details

- i) Village ii) Sex M/F
- iii) Occupation.....
- iv) Number of households
- v) Number of bedrooms
- vi) Number of bed nets treated Untreated
- vii) Number of children by gender Male Female

Section B: Information about knowledge of malaria

1. Have you ever heard of Malaria?
Yes No
2. Has any member of your Family contracted Malaria?
Yes No
3. How is Malaria transmitted?
By eating watermelons By eating unripe sweet reeds
By drinking dirty water By being bitten by Mosquitoes
Any other.....
4. State the vector of Malaria.....
5. How do you detect that someone is suffering from Malaria?
Shivering High body temperature Nausea
Vomiting Sweating excessively Loss of appetite
Painful joints Any other.....

Section C: Information on prophylactic management of malaria

1. What methods do you use to prevent yourselves from contracting Malaria?

a) Listed below are some modern methods used to manage Malaria prophylactically.

Number the methods in order of preference and state the reasons for preference

| Modern method | Preference order | Reason |
|----------------------------|------------------|--------|
| Insecticide Residual spray | | |
| Insecticide treated nets | | |
| Mosquito coils | | |
| Mosquito repellent jelly | | |
| Prophylactic tablets | | |

Traditional remedies: list down in order of preference any traditional prophylactic remedies you use and state the method of preparation and administration.

| Remedy in order of preference | Method of preparation | Method of Administration |
|-------------------------------|-----------------------|--------------------------|
| 1. | | |
| 2. | | |
| 3. | | |
| 4. | | |
| 5. | | |
| 6. | | |

Section D: Information on therapeutic management of malaria

1. How do you handle malaria cases within your family?

Listed below are some of the methods used to treat or handle malaria cases. Number the methods in order of preference.

| Methods | Preference order | Reason |
|-------------------------------|------------------|--------|
| 1.Consult chloroquine holders | | |
| 2.Consult faith healers | | |
| 3.Consult traditional healer | | |
| 4.Visit rural health centers | | |
| 5.Used traditional medicines | | |

2. For traditional methods used indicate name of traditional medicine, part used, method of preparation, administration and side effects.

| Name of traditional medicine | Part used | Method of preparation | Method of administration | Effects |
|------------------------------|-----------|-----------------------|--------------------------|---------|
| 1 | | | | |
| 2 | | | | |
| 3 | | | | |
| 4 | | | | |
| 5 | | | | |

What action do you take if a patient does not show signs of healing after using methods above:

- 1.....
- 2.....
- 3.....
- 4.....
- 5.....

Interview guide for chloroquine holders

This interview guide serves to solicit information from home based chloroquine holders on methods used and encouraged in managing Malaria in your home area. The information obtained will help your community and Zimbabwe at large. Your selfless help will assist in making this project succeed. The information obtained will be confidentially treated.

1. What Malaria control and preventive measures do you encourage your people to carry out.
List in order of preference.

| Measure | Reason for preference |
|---------|-----------------------|
| 1. | |
| 2. | |
| 3. | |
| 4. | |
| 5. | |

2. List
 - (a) Preventive drugs encouraged
 - (b) Therapeutic drugs administered to patients
3. Do you encourage the use of traditional methods of managing Malaria?
 - (a) Prophylactically Y/N
 - (b) Therapeutically Y/N

If no, state the reasons.....

If yes, fill the table below

| Remedy | Part of plant used | Method of preparation | Method of administration |
|--------|--------------------|-----------------------|--------------------------|
| 1 | | | |
| 2 | | | |
| 3 | | | |
| 4 | | | |
| 5 | | | |
| 6 | | | |

4. How often do you meet to talk about the disease malaria with:
 - a) Other chloroquine holders
 - b) The general public
 - c) The health officers.....

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