
Knowledge, practices, and perceptions about malaria in rural communities of Zimbabwe: relevance to malaria control

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A survey of 411 household heads was undertaken in Gokwe district, Zimbabwe, to assess villagers' knowledge, practices and perceptions about malaria and their implications for malaria control. Our results show that although the government has sustained an annual indoor insecticide spraying programme for over four decades, about 50% of respondents did not adequately understand its purpose, with 26% believing that the programme was intended to kill domestic pests, not including mosquitos. During the 1991–92 spraying cycle, 72% of the villagers had their homes sprayed. However, 21% of such villagers refused to have some rooms in their homes sprayed. Householders' understanding of the function of the spraying programme was significantly related to their compliance with it ($P < 0.05$). A total of 82% of respondents reported not taking any measures to protect themselves from malaria. Taking preventive measures was significantly related to knowledge of the causes of malaria ($P < 0.05$). The study shows the importance of involving communities in a control programme intended to be to their benefit and of informing them about available options for protection against malaria.

Introduction

Malaria is a serious public health problem in Zimbabwe. *Plasmodium falciparum*, responsible for the most severe and potentially fatal form of the disease, accounts for 97% of malaria infections in the country (1). Between 1980 and 1987, deaths due to malaria constituted 4% of all registered deaths in Zimbabwe, and malaria is one of the leading ten causes of admission to hospital, accounting for approximately 10% of total hospital bed occupancy in the country (2). A total of 55% of the population reside in malaria-endemic areas, and there has been a consistently high incidence of morbidity due to malaria since 1980.

Zimbabwe has had a national malaria vector control programme since 1949, relying on intradomestic spraying in affected areas. DDT was exclusively used in malaria control from 1950 to 1991, when deltamethrin and other synthetic pyrethroids began gradually to replace it. From 1980 the malaria spraying programme was administered by the Blair

Research Laboratory, but recently management of the programme has been decentralized to the provincial health authorities, who are now responsible for its planning and implementation, as well as for administrative and financial control. The government spends approximately Z\$5 million (US\$ 625 000) each year on the spraying programme and has continuously emphasized the need for obtaining maximum cooperation from its beneficiaries if the desired results are to be realized.

The aim of this study was to assess perceptions and knowledge about malaria and the malaria spraying programme in rural communities. Determined also was the level of compliance with the programme, and explanations were sought to account for this.

Materials and methods

Study area and population

The study was undertaken in the Gokwe district of Zimbabwe (approximately lat. 18°15'S, long. 28°20'E), which has a population of 403 000 people. Malaria transmission in the district is hyperendemic, with one peak transmission season from February to May. The main strategy to control the disease is an annual indoor insecticide spraying programme instituted by the government. Recently there have been several outbreaks in the district; for example, a major outbreak occurred in 1989, when more than

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250 people died and around 100 000 clinical cases were recorded.^a A more recent outbreak occurred in the southern part of the district at well over 1200 m above sea level, an altitude where malaria is usually absent. The severity of this outbreak, which was accompanied by chloroquine-resistant infections, necessitated mass chemotherapy as well as insecticide spraying (3).

Study design and data collection

A multistage random sampling procedure was used to select a representative sample of 411 household heads. Five out of 38 wards were randomly selected for inclusion in the study.^b In each of the five wards, three villages (defined as geographical units headed by a *kraal* head or *kraals*) were randomly selected. In each of the selected *kraals*, households were randomly chosen from lists obtained from village leaders. Women were the main subjects because, in Zimbabwe's rural areas, women are usually the *de facto* heads of households; household-based interviews using a structured questionnaire were conducted with them. In households where there was no female head, the male head of the household was interviewed. The survey was conducted over a period of 3 weeks in June 1992.

Data analysis

Data were analysed with SPSS/PC+ and Epi Info software. Differences between proportions found in different groups were tested for statistical significance using the χ^2 test.

Results

Sociodemographic characteristics of study subjects

Females constituted 80% of the 411 heads of households that were interviewed. The majority of respondents (83%) depended on subsistence farming for their livelihood, 7% were unemployed, 3% had full-time formal employment, 3% had part-time formal jobs, 3% were self-employed, and 1% retired. Most respondents either had no schooling (40%) or had only 1–7 years of schooling or primary education (48%). Only 11% had secondary school education,

and 1% had tertiary education. A total of 65% of respondents said they had been living in the district for more than 10 years.

Perceptions and knowledge about malaria

The majority of respondents (58%) mentioned malaria (or equivalent vernacular terms: *nyongo*, *svoto*) as the most common disease affecting people in the study area. About 55% of the villagers mentioned mosquitos as a factor in causing the disease (see Table 1). There was a significant difference in respondents' knowledge of the causes of malaria by ward ($\chi^2 = 14.34$, $P = 0.01$, $n = 411$) (Table 2). Only 31% of the subjects said they had received some form of health education on malaria; cited sources of education were nurses (39%), environmental health technicians (28%), village community workers (19%), the media (12%), and spraymen (2%).

Morbidity and utilization of health services

Most respondents (73%) had suffered from malaria at least once. A total of 40% knew of at least one person in their village who had died of malaria in the previous 3 years, and 22% had at least one relative who had died of malaria during the same period.

Table 1: Causes of malaria as reported by respondents

Causes of malaria	Frequency
Mosquito bites only	202 (49) ^a
Mosquito bites and other causes	23 (6)
Eating raw vegetables	17 (4)
Drinking dirty water	38 (9)
Don't know	81 (20)
Other incorrect causes	50 (12)
Total	411 (100)

^a Figures in parentheses are percentages.

Table 2: Causes of malaria as reported by respondents, by ward

Ward	No. of respondents	Causes of malaria	
		Mosquito bites (%)	Other explanations (%)
Njelele 3	88	67.0	33.0
Chisina 2	86	47.7	52.3
Nemangwe 3	81	64.2	35.8
Nemangwe 5	85	43.5	56.5
Nenyunga	71	49.3	50.7

^a Gokwe District health statistics. Unpublished document, Ministry of Health, Zimbabwe, 1991.

^b A ward is a geographical area with a population of 6000–10 000.

Most respondents (61%) had witnessed at least one household member suffer from malaria in the 1992 transmission season. Of these patients, 76% were reported to have sought treatment from a health centre. Other service providers utilized were shops (7%), community workers (2%), malaria spraying teams (7%), and others (6%). Drugs mentioned as having been taken for malaria included chloroquine (44%), sulfadoxine + pyrimethamine (10%), and paracetamol (2%). Many respondents (44%) did not know the names of the drugs concerned.

Decision-making at the household level concerning when and where to seek health care was said to be the responsibility of the male head of the household by 60% of the respondents, while 16% said it was the female head's responsibility. Joint decision-making between the male and female head was reported to occur in 16% of the households, while 4% said that patients themselves made the decision about seeking health care.

The proportion of households in the sample where the male head was present during decision-making was not measured.

Treatment of malaria

Of those who mentioned chloroquine and sulfadoxine + pyrimethamine as malaria medication, a relatively high proportion (56%, $n = 161$) knew what constituted a complete course of treatment for the disease. Overall, 39% of all the study subjects knew what constituted a complete course of malaria treatment. No differences in this knowledge were found between groups of respondents with different levels of education. Of those who had ever received malaria drugs, 27% reported that they did not complete the full course of treatment. The principal reason mentioned for this was that they had recovered and wanted to keep the remaining drugs for future use by other household members.

Altogether, 28% of respondents said they knew of some traditional medicines for treating malaria, while 7% said there was no traditional medicine for the disease. Traditional malaria medication is based on the use of substances such as pepper, salty water, and bitter fruits, roots, leaves, and bark of certain trees. Most of these substances are ground into powder and boiled in water, to be taken as a drink, or added to food.

Personal primary prevention measures

A total of 64% of respondents reported that they did not take any measures to prevent mosquito bites. The remaining respondents took various measures (see Table 3). However, an even higher proportion

Table 3: Methods used by the study subjects to prevent mosquito bites

	Frequency
Mosquito net	36 (9) ^a
Mosquito coils	27 (7)
Repellents	6 (2)
Burning cow dung	25 (6)
Burning tree leaves	10 (2)
Other	42 (10)
Nothing	263 (64)
Total	409 (100)

^a Figures in parentheses are percentages.

of respondents (82%) said they did not take any measures to prevent malaria. Knowledge of malaria transmission was significantly associated with taking measures to prevent mosquito bites ($\chi^2 = 8.87$; $P = 0.01$, $n = 411$) and malaria ($\chi^2 = 7.27$; $P = 0.03$, $n = 411$).

Compliance with the malaria spraying programme

During the 1991–92 spraying season, 72% of respondents' homes were sprayed. However, 21% of these individuals refused to have either the bedroom (75%) or the kitchen (25%) sprayed for religious or cultural reasons or because the room was "locked". Only 11% of respondents said their homes had been sprayed in every one of the previous 5 years, yet only 3% said they had refused to have their homes sprayed. Some of the reasons offered for this low rate of spraying were that there was nobody at home when the spraymen came, that the spraymen never came, or that there was inadequate water for spraying.

One hundred respondents (24%) said they did not know why the spraying exercise was undertaken. Of those that said they did know, 34% offered incorrect explanations, failing to recognize either the link between spraying and mosquitos or mosquitos and malaria. About 26% of respondents believed that the spraying programme was designed to kill domestic pests such as cockroaches, bedbugs, lice, and lizards.

Importantly, householders' perceptions of the function of the spraying programme were significantly associated with allowing their homes to be sprayed. A total of 42% of homes whose householders thought spraying was for killing domestic pests were not sprayed in the 1991–92 spraying season. The corresponding proportion was 35% among those who did not know why their homes were sprayed, but dropped to 22% among those villagers

who knew that the programme was designed to control mosquitos and malaria ($P = 0.013, n = 394$). Interestingly, these perceptions also influenced whether householders would allow only partial spraying of their homes. Those who thought that the programme was aimed at killing domestic pests were more likely to refuse to have some of their rooms sprayed (11.5%) than either those who did not know the purpose of the programme (6.1%) or those who said the programme was aimed at controlling malaria (8.6%) ($P = 0.029, n = 394$). While the majority of respondents thought the spraying exercise was necessary, 12.7% said it was unnecessary. Most villagers (81%) were satisfied with the conduct and attitude of the spraysmen.

Discussion

Previous evaluations of the malaria control programme in Zimbabwe have focused on technical and administrative issues.^{c,d} The present study explored villagers' knowledge, perceptions, and practices about the cause, treatment, and prevention of malaria and their bearing on the control of the disease. Our results show that despite widespread knowledge about the morbidity of malaria, understanding about its transmission, treatment, and prevention was relatively low in Gokwe district. There are several important consequences of this finding in light of the hyperendemicity of the disease in the district.

Those villagers who had poor knowledge of malaria and its causes reported not taking measures of their own to protect themselves. Rather, they benefited only from the spraying programme or from chemotherapy. This is consistent with findings from other studies that show that if people do not perceive the mosquito to be responsible for malaria transmission they do not take significant measures to protect themselves against the vector (4–6). Importantly, previous studies have shown that knowledge about the malaria vector and the purpose of indoor spraying considerably reduce the risk of infection (7).

Although the indoor spraying programme has been sustained for over 40 years as the mainstay of malaria control in Zimbabwe, a significant proportion of the target communities continue to have a

poor understanding of why their homes should be sprayed. Our results show quite clearly that householders' level of understanding about the purpose of the spraying programme was strongly associated with having their homes sprayed or having only some of the rooms sprayed. Though the spraying coverage of homes was relatively high (72%), only 57% of respondents had their homes completely sprayed. Villagers whose homes were partially sprayed (15%) refused to have either the bedroom or the kitchen sprayed; this has significantly weakened the malaria control programme since peak vector biting occurs at night (8, 9) when villagers are in these rooms, either asleep or resting. Malaria spraying teams working more closely with villagers could play a major role in overcoming this problem.

For a sizeable proportion of villagers, the main reason for allowing their homes to be sprayed was the hope that they would experience a reduction in domestic pests, which they sometimes see dying after spraying, and only to a lesser extent an expected reduction in mosquitos. Interestingly, according to reports from the malaria spraying programme authorities, villagers' expectations that insecticides would kill cockroaches and bedbugs was one of the main reasons in the 1980s for community opposition to spraying when these domestic pests developed tolerance to DDT. Although this may not have received much consideration, such a misconception has major implications for malaria control, since community opposition to spraying may mount when an affordable insecticide is no longer effective on domestic pests, or even on nuisance culicine mosquitos, which readily develop insecticide tolerance (8), even though it is still effective on the anopheline malaria vector. There is therefore a need to inform villagers explicitly that the reason for spraying is to kill the mosquito vectors of malaria and that spraying may not kill other domestic pests.

It was encouraging to discover that villagers' ability to recognize malaria symptoms was relatively high and that antimalarial drugs were available through a number of channels. However, several problems arising from the community's incomplete understanding about malaria made for ineffective chemotherapy. Knowledge concerning the treatment of malaria was such that almost half of the villagers did not know the names of antimalarial drugs or the importance of completing a full course. It was therefore not surprising that intake of sub-therapeutic doses was prevalent (27%), with malarious individuals ceasing to take antimalarial tablets once they felt better. Added to this was an apparent belief that bitter-tasting substances can cure malaria. For people who have not developed immunity to malaria

^c **Marshaal HAH.** *Zimbabwe Malaria Control Programme: review and views.* Unpublished document, November 1990.

^d **Teklehaimanot A.** *Report on the evaluation of the National Malaria Control Programme of the Republic of Zimbabwe.* Unpublished document, December 1989.

it is important that the correct treatment be effected promptly, because of the risk of complications. Delays in seeking medical attention while hoping to cure malaria with bitter-tasting substances may be a contributory factor to the incidence of severe, complicated cases of malaria that are common in the district.

The study also showed a low utilization rate (2%) of village community workers (VCWs), the grassroots health cadre. This finding, which has been reported by other workers (10, 11), may be due to the following reasons: villagers have no confidence in the ability of VCWs to treat malaria; VCWs often do not have sufficient drug supplies, as was the case in Gokwe; and VCWs have demonstrated less understanding of the disease than health centre staff. Villagers seemed to prefer going directly to the health centre or buying drugs from shops to going to VCWs. VCWs, who sometimes treat patients with suspected malaria and educate community members on health matters, should be made more fully aware of the causes and treatment of malaria and should have adequate drug supplies.

One of the important points to emerge from this study is that, while considerable sums of money may be spent on a sustained insecticide spraying programme and on treatment of malaria, as long as communities are not educated and involved, poor compliance may militate against its success. Judging from the educational profile of villagers, the majority of whom either had primary schooling or none at all, it may be beneficial to incorporate basic information on malaria and its prevention in the primary educational curriculum. A cadre of grassroots health workers, such as environmental health technicians, who are mobile, well-trained, and interact closely with the community, could be used to impart knowledge on the function of the spraying programme and the need for villagers to allow all their rooms to be sprayed. Without such deliberate effort, beliefs and practices that militate against the control programme are likely to remain dominant (5).

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Résumé

Connaissances, pratiques et perceptions au sujet du paludisme dans des communautés rurales du Zimbabwe: intérêt du point de vue de la lutte antipaludique

Le paludisme est une cause majeure de morbidité et de mortalité au Zimbabwe. Depuis 1949, le gouvernement a mis en œuvre un programme de pulvérisations annuelles d'insecticide à l'intérieur des habitations à titre de stratégie principale de lutte antipaludique. Une étude transversale à base communautaire a été réalisée dans les zones rurales du district de Gokwe pour évaluer les connaissances, pratiques et perceptions des habitants au sujet du paludisme et leurs répercussions sur la lutte antipaludique. Un protocole de sondage en plusieurs étapes a été utilisé pour sélectionner 411 chefs de famille aux fins de l'enquête.

Nos résultats montrent que, bien que les pouvoirs publics aient poursuivi le programme de pulvérisations depuis plus de 40 ans, environ 50% des enquêtés ne savaient pas exactement pourquoi leurs maisons devaient être traitées, 26% pensant que le programme était destiné à tuer des espèces domestiques nuisantes comme les cafards, les punaises de lit, les poux et les lézards, mais non les moustiques. Bien que 72% des habitations aient été traitées par la deltaméthrine au cours du cycle de pulvérisations de 1991-1992, seules 57% d'entre elles ont été entièrement traitées. Sur les 296 chefs de famille dont les maisons ont été traitées, 21% ont refusé de faire traiter soit la chambre à coucher (75%), soit la cuisine (25%). En fait, près de 13% des villageois pensaient que le programme de pulvérisations n'était pas nécessaire. Ces attitudes, notamment le refus d'autoriser une couverture complète par les pulvérisations, affaiblissent notablement le programme de lutte.

Peu de villageois ont rapporté prendre des mesures de leur propre initiative pour empêcher les piqûres de moustiques (36%) et le paludisme (18%). Il est important de noter que les connaissances sur la transmission du paludisme étaient de façon significative associées à la prise de mesures visant à empêcher les piqûres de moustiques ($p = 0,01$) et le paludisme ($p = 0,03$). De plus, les connaissances des villageois quant à l'objectif du programme de pulvérisations étaient associées de façon significative avec le traitement de leur maison ($p = 0,01$) ou avec traitement partiel ($p = 0,03$). Pour une proportion notable de

villageois, la principale raison d'autoriser les équipes à traiter leurs maisons était l'espoir d'obtenir une réduction des espèces nuisantes. Cette attitude a des répercussions majeures sur la lutte antipaludique, car l'opposition de la communauté peut être renforcée lorsqu'un insecticide de coût abordable n'est plus efficace contre les espèces nuisantes, même s'il l'est encore contre les anophèles vecteurs du paludisme.

Le niveau de connaissances des villageois sur les symptômes du paludisme était en général bon, et les médicaments antipaludiques étaient facilement disponibles. Toutefois, une connaissance incomplète du traitement entraînait fréquemment la prise de doses insuffisantes d'antipaludiques, 27% des sujets atteints de paludisme cessant de prendre les médicaments dès qu'ils se sentaient mieux. A ce problème s'ajoutait une croyance couramment répandue selon laquelle des herbes et substances amères sont capables de guérir le paludisme. Ces facteurs peuvent contribuer à l'incidence élevée des cas graves et compliqués dans le district.

Il est possible d'améliorer le programme de lutte antipaludique au Zimbabwe en s'attaquant aux facteurs qui militent actuellement contre le programme de pulvérisations, et en mettant en place des activités suivies d'éducation de la communauté destinées à améliorer la prise de conscience des habitants et leur participation à la lutte contre le paludisme par le biais de la protection personnelle, de la gestion de l'environnement et d'autres mesures communautaires qui, à présent, font le plus souvent défaut.

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