BRIEF REPORT

EVALUATION OF MALARIA HEALTH EDUCATION INTERVENTIONS USING KNOWLEDGE, ATTITUDES AND PRACTICES (KAP) IN SOUTH AFRICA

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1. Introduction

Malaria remains a major public health problem in sub-Saharan Africa (Goodman & Mills, 1999; Agyepong *et al*., 2002; Müller *et al*., 2003) and Southern African Development Community (SADC) in particular (DaSilva *et al*., 2004). In South Africa, malaria is notoriously known to affect, mainly, north-eastern areas bordering Mozambique, Swaziland and Zimbabwe (Sharp & Le Sueur, 1996). However, the view that malaria remains a major public health problem in the region does not negate the achievements made through multiple malaria control intervention strategies in South Africa. The LSDI (Lubombo Spatial Development Initiative), which was officially inaugurated by the three country (Mozambique, South Africa and Swaziland) ministerial signing of a protocol of agreement in 1999 (Sharp *et al*., 2007), has also contributed, significantly, to these successes. LSDI programme views malaria as a problem that requires regional interventions rather than the individual countries in isolation from one another.

Malaria control in South Africa is, mainly, by means of a combination of indoor residual house spraying (IRS), prompt effective diagnosis and treatment of cases at primary health care facilities. In addition to these intervention strategies, people are encouraged to implement complementary personal protective measures. Health education strategies are central in mobilising communities to support malaria control measures implemented by the government departments and structures, as well as applying personal protective measures at a household level. However, all these interventions need to be evaluated. It is therefore against this background that KAP studies are envisaged not only to be helpful in the evaluation of malaria intervention strategies, but also to provide valuable insights necessary to guiding the implementation of malaria health promotion strategy.

2. Background

South Africa, a country with nine Provinces, is at the southern-most fringe of malaria transmission in Africa. Malaria transmission is seasonal, with an annual peak from September to May (Draft Malaria Health Promotion Strategy for South Africa, 2007). Malaria is limited to the north-eastern border areas of three provinces (Mpumalanga, KwaZulu-Natal and Limpopo). Notably, all these malaria affected Provinces share borders with countries, such as, Mozambique, Swaziland, Zimbabwe and Botswana. In all the three Provinces, districts which border malarious neighbourhoods appear to bear most malaria cases.

In KwaZulu-Natal, north-eastern part and Umkhanyakude district in particular is the most malarious district within the Province. In Mpumalanga Province, more cases are reported in Nkomazi sub-district, especially in Tonga health sub-district. For example, approximately 80% of the Province's malaria cases are reported in Tonga (Mpumalanga Malaria Information System, unpublished data). In Limpopo Province, Vhembe and Mopani are known to be high risk districts, with low case number reported from Sekhukhune and Waterberg (Department of Health, 2003). Limpopo borders a number of countries, for example, the northern part (Vhembe) borders Zimbabwe, eastern part (Mopani) is located near Mozambique, southern part (Sekhukhune) borders Swaziland and western part (Waterberg) borders Botswana.

3. Overall objective

The overall objective of this study was to determine the knowledge, attitudes and practices towards malaria and its prevention in three malarious Provinces in South Africa, so that the results could be used to inform IEC activities.

4. Study design

The study design was a descriptive two-phase cross-sectional intervention survey, which used a structured interviewer administered questionnaire. The first phase (baseline survey) was undertaken in 2004 in KwaZulu-Natal and Limpopo, followed by health education interventions. Because Provinces have their dynamics and priorities, Mpumalanga did not participate in 2004 baseline community survey, but only conducted a survey on primary school learners. However, community health education interventions which stemmed from the 2004 survey recommendations were rolled-out to all three Provinces. As a result, the 2006 survey results from all three Provinces were analysed jointly.

Participating into the study were Muyexe and Sikhunyani under Mopani district in Limpopo, Tonga health sub-district under Ehlanzeni district in Mpumalanga and five areas (Makanis, Mamfene, Ndumo, Shemula and Tetepan) of Umkhanyakude district in KwaZulu-Natal. The post-intervention survey was undertaken within the same sites, where baseline survey was conducted. Several different types of data were collected through a questionnaire, including malaria knowledge, treatment-seeking behaviour, preventive measures and spraying data.

5. Sampling

Year of Survey	KZN	Limpopo	Mpumalanga	Total
2004	397	400	No survey done	797
2006	440	498	451	1389

The above sample was randomly selected in each of the participating sites. Malaria Control Programmes in the respective Provinces drove the process of identifying study sites, in line with their needs and informed by malaria case reporting data.

6. Data collection

In each Province, unemployed matriculated local people were recruited for data collection. They were given two-day competitive training on data collection, followed by the piloting of a questionnaire. In each homestead the head of a household or any responsible adult thereof, was identified and interviewed after consenting verbally. Minors were not interviewed.

7. Post- 2004 survey interventions

Based on the knowledge gaps identified by the 2004 survey, a number of information, education and communication (IEC) interventions were developed. Among other materials developed were: community health worker manual, flip charts and posters. Information contained by the manual ranged from basic malaria information to diagnosis and treatment. On the other hand, flip chart had a lot of visuals/ pictorials, with minimal text, whereas posters were split into two: the first one was on signs and symptoms and the second one contained information on prevention. The process of developing these materials and running of trainings was driven by RTI International in full collaboration with the National and Provincial Departments of Health. The different groups of people, such as, CHWs, nurses and teachers, were trained, on the grounds that they would serve as important carriers and disseminators of malaria knowledge.

8. Results

For 2004 survey, the overall percentage is averaged using two provinces (KwaZulu-Natal and Limpopo), hence no baseline community survey was conducted in Mpumalanga in 2004. However, although the 2006 community survey in Mpumalanga could be seen as a baseline study, its results were analysed together with KwaZulu-Natal and Limpopo. This was, mainly, because malaria education strategies which emerged as recommendations of 2004 baseline surveys in KwaZulu-Natal and Limpopo were also rolled-out in Mpumalanga. This means that all provinces had received similar interventions at the time of the 2006 community KAP surveys.

8.1 Malaria information and knowledge

Table 1: Breakdown of percentage of people heard and not heard about malaria

		KwaZulu-Natal (%)	Limpopo (%)	Mpumalanga (%)	Average (%)
2004	Heard	95	80.5	-	87.8
	Not heard	5	19.5	-	12.2
2006	Heard	100	96.6	82.7	93.1
	Not heard	0	3.4	17.3	6.9

The number of people heard about malaria increased by 5.3% from an average of 87.8 in 2004 to 93.1% in 2006. KwaZulu-Natal in particular had the highest number of people who had heard about malaria in both time periods (2004 and 2006). This was not surprising, given the fact that the study conducted by Mnzava and colleagues in KwaZulu-Natal in 1995, had already showed that the majority of the respondents (over 90%) in surveyed areas had heard about malaria (Mnzava *et al*., 1998). Strikingly, everyone interviewed reported to have heard about malaria in KwaZulu-Natal in 2006. Similarly, the increase in Limpopo was substantial (16.1%) from 80.5% in 2004 to 96.6% in 2006. The number of people heard about malaria in Mpumalanga in 2006 was almost similar to the number of people heard about malaria in Limpopo in 2004.

Results from other studies, with regards to malaria information, have varied widely. For example, in Purworejo district in Central Java, Indonesia in 2001, 97% of the respondents had heard about malaria (Sanjana *et al*., 2006). In Enugu, Nigeria, malaria knowledge reflected rural-urban dichotomy, hence the study conducted among caregivers revealed that 99% of the respondents in urban Enugu compared to 74% in rural Enugu (P 0.05) had heard about malaria (Oguonu, Okafor, & Obu, 2005). In rural Bolifamba, south-west Cameroon, a two-phase cross-sectional intervention study undertaken by Nkuo Akenji and colleagues, found that about 80% of the people participating into the study had knowledge of malaria prior to intervention, the figure which increased by 16% to 96.9% in the post-intervention (Nkuo Akenji *et al*., 2005).

Table 2: Reported sources of malaria information dissemination

Variable		KZN (%)	Limpopo (%)	Mpumalanga (%)	Average (%)
Family/ friend	**2004**	13.6	16.8	-	15.2
	2006	5.4	23.5	27.1	18.7
Community leaders/ meetings	**2004**	6.8	3.8	-	5.3
	2006	8.4	12.7	0.7	7.3
Radio	**2004**	5	20.8	-	12.9
	2006	2.5	42	18.8	21.1
Pamphlets/ posters	**2004**	9.3	0.5	-	4.9
	2006	0	0.2	7.8	2.7
Health facility	**2004**	53.9	37	-	45.5
	2006	34.3	54.8	41	43.4
Malaria Camp	**2004**	5	0.5	-	2.8
	2006	7.7	2.4	0.9	3.7
CHW	**2004**	0	0	-	0
	2006	46.1	24.5	37.3	36
Forgot	**2004**	1.5	0	-	0.8
	2006	1.6	3	1.1	1.9
Other	**2004**	2.8	4.5	-	3.7
	2006	1.6	1	3.1	1.9
N/A	**2004**	5.3	1.3	-	3.3
	2006	0	1.6	17.1	6.2

Table 2 above shows most community members received malaria information from the health facility. The pattern seemed to be consistent across both surveys. As an indication of the effectiveness of malaria health education through community health workers (CHWs) introduced after 2004 survey, the average number of respondents who reported to have heard about malaria from CHWs increased from 0% in 2004 to 36% in 2006. All Provinces reported that CHWs had not been used for malaria education prior to 2004 community survey. The above Table also show some Province dynamics, for example, in 2004, Limpopo had a high score of people reported to have heard about malaria from the radio (20.8%) compared to only 5% in KwaZulu-Natal. The study conducted in south-western Uganda, showed a high level of radio and health worker usage, whereby, 62.3% and 60.6% of the respondents had heard about malaria from the radio and health workers, respectively (Ndyomugyenyi, Magnussen & Clarke, 2007). On the other hand, the very small number of people heard about malaria from the radio in KwaZulu-Natal was halved in 2006, while the doubling in Limpopo and reasonable in Mpumalanga (18.8%). In overall, the effectiveness of the above-mentioned facilities in communicating malaria information increased between 2004 and 2006, with the exception of posters/ pamphlets and health facility.

Table 3: Proportion of people correctly associating malaria infection to mosquito bites

		KZN (%)	Limpopo (%)	Mpumalanga (%)	Average (%)
2004	Association	92.3	93	-	92.7
	No association	7.7	7	-	7.3
2006	Association	92.7	94.2	71.8	86.2
	No association	7.3	5.8	28.2	13.8

In KwaZulu-Natal and Limpopo, there was a very marginal increase of people who correctly associated malaria infection to mosquito bites from 92.3% to 92.7% and 93% to 94.2%, respectively. The number of people who could make correct association between malaria infection and mosquito bites in Mpumalanga in 2006 was of great concern. Although the room for further improvement exists, in as far as correct association between malaria infection and mosquito bites is concerned, these results were reasonable when viewed against many other studies conducted elsewhere. For example, correct association was made by 85% of the respondents in Buenaventura, a port on the Pacific Coast of Colombia (Nieto *et al*., 1999), 80.5% in coastal south India (Unnikrishnan, Jaiswal & Reshmi, 2008), 73% in Nepal (Joshi & Banjara, 2008), 69% in Central Java (Sanjana *et al*., 2006), 66% in Butajira district, southern Ethiopia (Deressa *et al*., 2003), 58.5% in Baringo district, Kenya (Munguti, 1998), 48% in southern Mexico (Rodriguez *et al*., 2003), 57% in Assam (Borah *et al*., 2004) and only 34% in Zanzibar (Alilio & Bammek, 1998).

Table 4: Community knowledge of the most common signs and symptoms of malaria as revealed by 2004 survey

	Signs and symptoms	KZN (%)	Limpopo (%)	Average (%)
2004	Headache	87.9	71	79.5
	High temperature/ fever	37	17.5	27.3
	Body pains	11.1	5	8.1
	Chills	75.6	33.5	54.6
	Vomiting	21.7	40.5	31.1
	Loss of energy	13.6	22	17.8
	Loss of appetite	9.3	7.8	8.6
	Dizziness	11.6	14.5	13.1
	Delirium	9.1	3.3	6.2
	Other	2.5	29.5	16
	Don't know	2.8	4.8	3.8

Despite noticeable inter-provincial dynamics, on average, headache and chills were the most known signs and symptoms of malaria. Poor mention of high temperature/ fever was worrisome, especially in Limpopo. Delirium, loss of appetite and body pains were the least mentioned signs and symptoms of malaria.

Table 5: Community knowledge of the most common signs and symptoms of malaria as revealed by 2006 survey

	Signs and symptoms	KZN (%)	Limpopo (%)	Mpumalanga (%)	Average (%)
2006	Headache	78.9	83.3	70.5	77.6
	High T°/ fever	5.2	31.9	53.4	30.2
	Body pains	11.8	13.5	17.5	14.3
	Chills	89.3	65.9	73.8	76.3
	Vomiting	37.5	63.7	43.9	48.4
	Loss of energy	26.1	29.5	14	23.2
	Loss of appetite	10.7	17.7	12.6	13.7
	Dizziness	2.3	3.8	2.7	2.9
	Delirium	7	5.6	8.9	7.2
	Other	2.3	15.9	0	6.1
	Don't know	0.2	3.8	14.6	6.2

In 2006 survey, headache and chills continued to be the most mentioned signs and symptoms of malaria in all three Provinces. The 2006 survey showed a further reduction in a number of respondents identifying high temperature/ fever as a sign and symptom of malaria in KwaZulu-Natal. At least, in Mpumalanga, more than half (53.4%) of the respondents identified high temperature/ fever as a sign and symptoms of malaria. On overall, vomiting was the third most mentioned sign and symptom of malaria in the 2006 survey. In other studies, headache, chills and high temperature/ fever were found to be the most mentioned signs and symptoms of malaria. For example, more than 70% of the respondents in Essequibo Coast of Guyana identified fever, headache and chills as the signs and symptoms of malaria (Booth & MacLean, 2001). Similar trends, whereby high temperature/ fever, headache and chills became the most frequently mentioned signs and symptoms (often exceeding 70%), were also observed in the studies conducted in Sri Lanka (Konradsen *et al.*, 1997), Buenaventura (Nieto *et al.*, 1999), Butajira district (Deressa *et al.*, 2003) and in Dangme West district in southern Ghana (Dunyo *et al.*, 2000).

8.2 Treatment and treatment-seeking behaviour

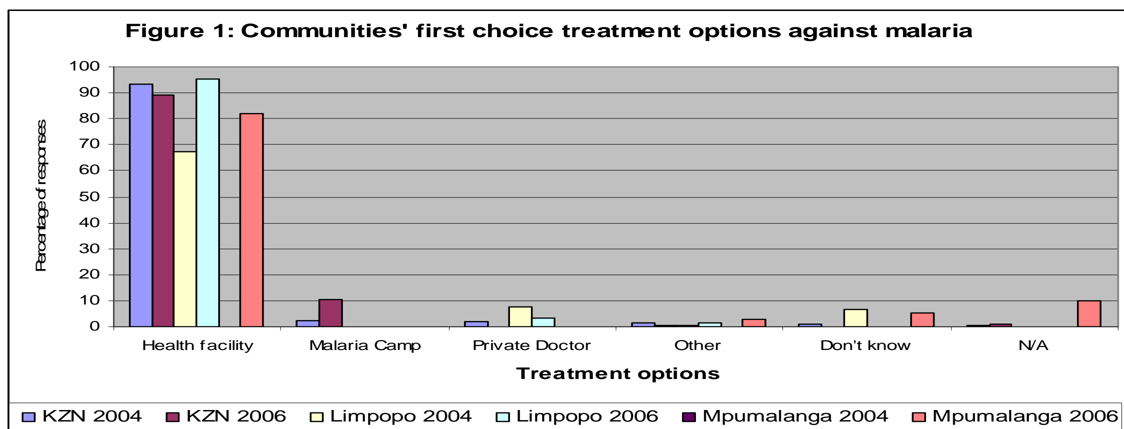
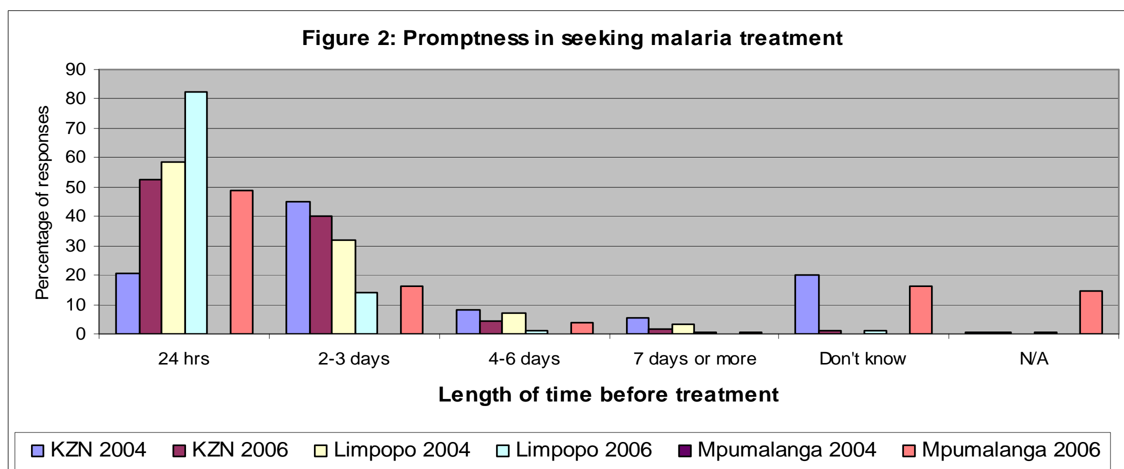


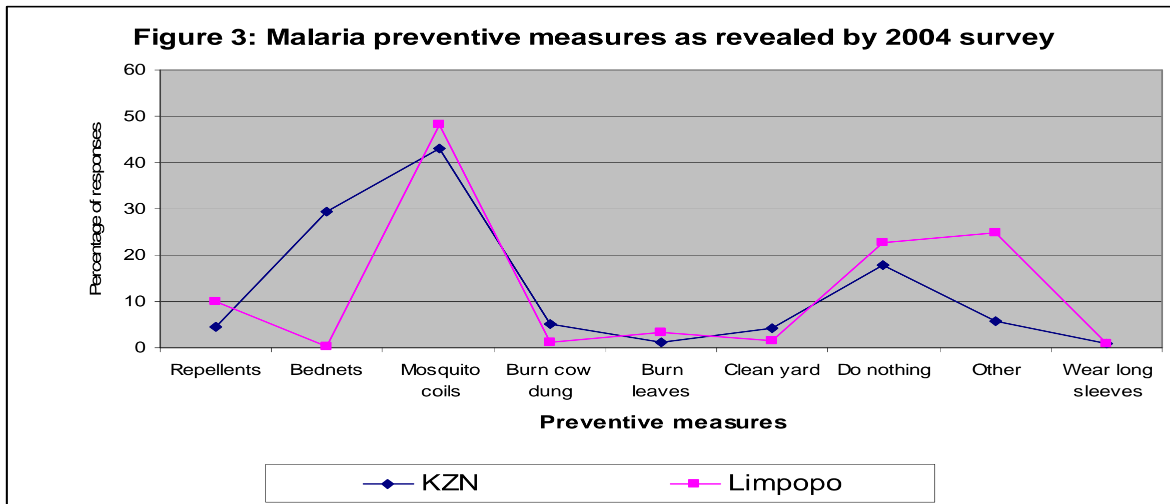
Figure 1: Communities' first choice treatment options against malaria

Figure 1 above illustrates a consistent pattern of the use of health facility as a first treatment option in all three Provinces. In Limpopo, there was a significant increase in the number of respondents who claimed to use health facility as their first choice treatment option. The increase was from 67.5% in 2004 to 95.2% in 2006. Notably, in KwaZulu-Natal, there was a slight reduction in the number of respondents who mentioned health facility as their first choice treatment option, while the number of respondents identifying Malaria Camp increased. Accounting for this increase was the discussion we had with field experienced Malaria Control Staff, who stated that most people preferred to visit Malaria Camp because, if tested malaria positive, they were given referral forms to health facilities. These referral forms enabled them not to join long queues at health facilities, thus saving them time and obtaining quicker medical attention.

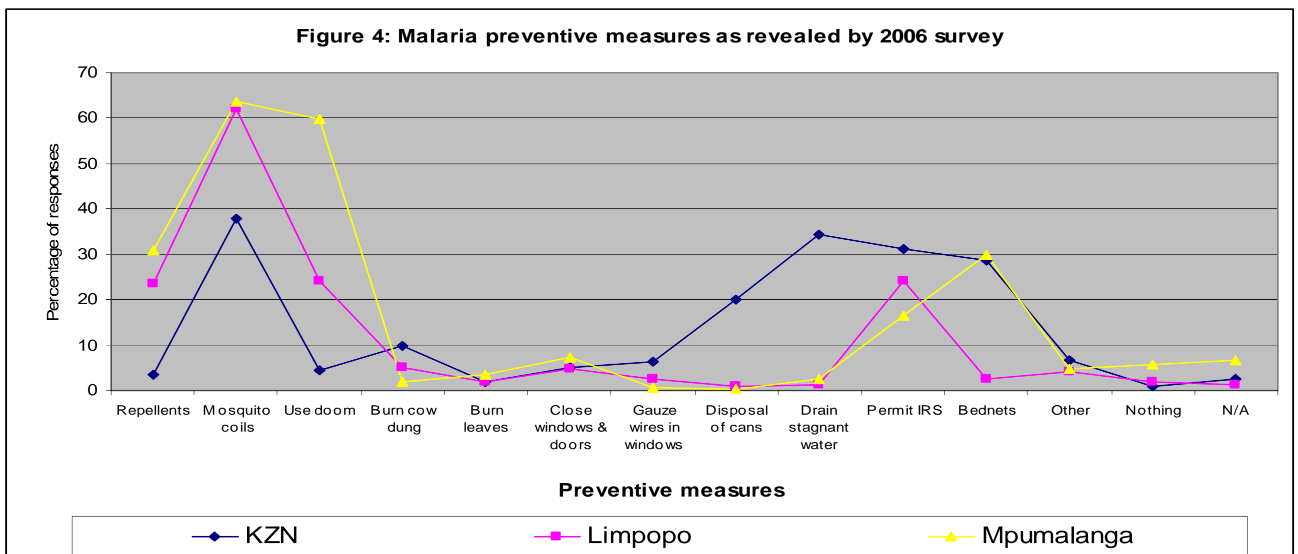


The 2006 survey showed a substantial increase in the number of respondents who asserted that they would seek treatment within 24 hours of onset of malaria symptoms. However, as encouraging as it may seem, the number of respondents who stated that they would seek treatment within 24 hours still fell below the World Health Organisation (WHO) recommendation, which stipulates that 'at least 60% of those suffering from malaria should seek treatment within 24 hours of the onset of symptoms' (WHO, 2000). Notably, Limpopo had an exception; hence the number of respondents who stipulated that they would seek treatment within 24 hours exceeded 80%.

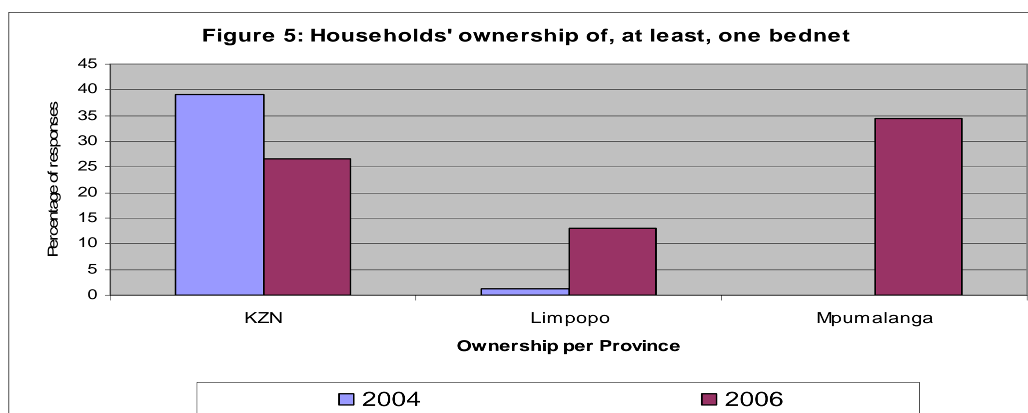
8.3 Malaria preventive measures



The 2004 survey showed that the majority of the respondents used mosquito coils as the preventive measure at a household level. However, the number of respondents who stated that they do nothing was of serious concern. The gap between KwaZulu-Natal and Limpopo in so far as households' ownership of bednets is concerned was substantial, although neither of them demonstrated good ownership of bednets.



The 2006 survey showed that in KwaZulu-Natal, the usage of mosquito coils was lower than Limpopo and Mpumalanga. Doom seemed to be another dominant measure in Mpumalanga, yet fewer respondents mentioned doom as one of their preventive measures in KwaZulu-Natal. There was more mention of correct disposal of cans, drainage of stagnant water and somehow bednets in KwaZulu-Natal than in Limpopo and Mpumalanga.



KwaZulu-Natal had a better ownership of bednets in 2004 compared to 2006, yet in Limpopo bednets ownership was increasing. Presenting these results to MCP Staff in KwaZulu-Natal, it appeared that field-based Malaria Control personnel were not surprised by the decline in bednet ownership; hence they claimed that they had already observed a pattern whereby many families were selling their bednets to Mozambicans. By 2006, Mpumalanga seemed to the Province with the highest households' ownership of bednets.

8.4 Spraying

Table 6: Community understanding of the reasons for spraying

	Reasons for spraying	KZN (%)	Limpopo (%)	Mpumalanga (%)	Average (%)
2006	Kill mosquitoes	96.6	96.2	78.9	90.6
	Kill other insects	0.7	2.4	4.2	2.4
	Other	0.5	0.2	0	0.2
	Don't know	2.5	1.2	17	6.9

Table 6 above shows a good understanding of the reasons for spraying in KwaZulu-Natal and Limpopo. The number of respondents who did not know the reasons for spraying in Mpumalanga was of great concern. In overall, 90.6% of the respondents in three malarious Provinces knew about malaria.

9. Conclusion

Malaria information has been fairly disseminated in South African malarious Provinces, with health facility, CHWs and radio being considered the main sources of information. Fair association between malaria and mosquito bites was established in KwaZulu-Natal and Limpopo. However, Mpumalanga still requires some attention. It is worrying that most respondents, especially in KwaZulu-Natal did not seem to think that high temperature/ fever, is an important sign and symptom of malaria. Despite that, most respondents seemed to use health facility as a first choice treatment option. There was a substantial increase on the number of respondents stating that they would seek treatment within 24 hours of onset of symptoms. Regardless of this increase, adhering to WHO recommendation was still a challenge, especially in KwaZulu-Natal and Mpumalanga. With regards to preventive measures, bednets ownership and use was very poor. It was mosquito coils which appeared to be widely used as a malaria preventive measure. However, it was encouraging to note that most respondents knew the reasons for the government

administered IRS, since association between IRS and the killing of mosquitoes was emphatically made, especially in KwaZulu-Natal and Limpopo.

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