**Knowledge, Perception and Control Practices of Malaria Vector among** **Caregivers of Under-five Children in Selected Rural Communities in Ibadan, Nigeria**

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**Abstract**

 Malaria remains one of the most devastating public health scourges especially in the tropics. Several studies have documented the prevalence of malaria among different vulnerable groups; however, an understanding of the communities’ knowledge, perceptions and practices relating to malaria is crucial to the success of specific control measures. The study therefore assessed the knowledge, perception and control practices of malaria vector among caregivers of under-five children in selected rural communities in Ibadan. A four-stage random sampling technique was used to select 510 respondents from six communities, three each from Akinyele and Lagelu Local Government Areas (LGAs). A pre-tested interviewer-administered semi-structured questionnaire was used to elicit information on socio-demographic characteristics, knowledge of malaria, and level of education. A 20-point Likert scale was used to assess knowledge with 1-10 and 11-20 rated as poor and good knowledge respectively. Data was analysed using descriptive statistics and chi square at 5% level of significance. The mean age of respondents and their under-five children were 31.6±10.1 years and 25.2±16.9 months respectively. Only 2% of the respondents had tertiary education, 74.1% had primary/secondary, while 22.6% had no formal education. The proportion of respondents with good knowledge of malaria was significantly higher in Lagelu than in Akinyele (p=0.00). A high proportion of respondents in Akinyele (81.2%) and Lagelu (66.7%) knew that malaria was transmitted by mosquitoes. Sanitary conditions identified by respondents to contribute to the spread of malaria in the two LGAs include stagnant water and overgrown bushes. More respondents in Lagelu than Akinyele knew that children under five and pregnant women are more susceptible to malaria. Means of prevention against malaria in Lagelu and Akinyele LGAs include use of insecticides (41.1%, 32.2%); ITNs (5.3%, 45.1%); untreated bednets (9.3%, 0.8%); and mosquito coils (78.9%, 43.9%). The other methods used by respondents were burning of orange and cassava peels; physical killing; window screening; door screening and sanitation. Although knowledge on malaria control appeared to be high, there was still room to improve on the control practices. Hence, health education and community outreach demonstration schemes are advocated.

**Keyword:** Malaria prevalence, Sanitary conditions, knowledge of Malaria, vector control, under-five children, rural communities

**Introduction**

 Malaria remains one of the world’s worst health problems, as it leads to 1.5 to 2.7 million deaths annually. Majority of these deaths occur among children under five years of age and pregnant women in sub- Saharan Africa because of their low level of immunity (Ouattara et al., 2011). In sub-Saharan Africa, malaria has been a major challenge to further improvement in child survival. This is especially so with malnutrition as a co-morbid condition coupled with delayed access to drugs during seasons of maximum transmissions.

 In Nigeria, malaria impacts on the development of the country as it causes death, reduces human work capacity or productivity in all sectors. Malaria reduces Nigeria’s GNP by 1.0% annually ($348 Million), and 25.0% of household income is expended on malaria control and treatment. Effective methods for reducing malaria infection exist but the challenge is their deployment in the context of weak health systems and poverty in many parts of Africa, Asia and Southern America. Other factors include insecticide resistance and parasite resistance to available antimalarial drugs; for example, Chloroquine which is the cheapest drug for malaria has lost its potency (Oladepo et al., 2010).

 A significant reduction of mortality, morbidity and economic losses can be achieved if control interventions with a proven track record, such as insecticide-treated nets (ITNs), long-lasting insecticidal nets (LLINs), prompt diagnosis and effective treatment using Artemisinin-based Combination Therapy (ACT) can be implemented in areas of highest need (Ouattara et al., 2011). The success of malaria control programmes however relies heavily on community perceptions and practices related to the transmission, treatment and control of malaria.

 Incorrect beliefs or inappropriate behaviour can interfere with the effectiveness of control measures, such as vector control and chemotherapy. This is particularly important in tropical areas where malaria control options are limited because of parasite resistance to anti-malarial drugs and the vector’s resistance to insecticides. In such instances, an understanding of the communities’ knowledge, perceptions and practices relating to malaria is crucial to the success of specific control measures (Oladepo et al., 2010). The objective of this study therefore was to assess the knowledge, perception and control practices of malaria vector among caregivers of under-five children in selected rural communities in Ibadan.

**Methodology**

***Study area***

 The study was carried out in six rural communities selected from Akinyele and Lagelu LGA (three communities each). The two local government areas (shown in Figure 1) were selected because they are both predominantly rural and similar. Akinyele local government area occupies a land area of 464.892 square kilometers with a population of 239,739, while Lagelu, local government area occupies a land area of 338 km² and a population of 167,824.

***Study design***

 A community-based cross-sectional design was adopted for the study.

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**Fig 1: Map of Ibadan metropolis showing the study local Government Areas**

***Selection of study locations***

 A four-stage random sampling method was used for the selection of respondents in this study. Stage one involved the purposive selection of two local governments: Akinyele LGA and Lagelu LGA. Stage two involved random selection of three wards from a list of wards in each local government area; and one community was randomly selected from each ward. Stage three involved the proportional allocation of the sample size required from each local government amongst the three communities based on population information obtained from the local government councils. The six communities are Ikereku, Akinyele and Olorisaoko in Akinyele local government; and Offa Igbo, Oyedeji and Lalupon in Lagelu local government (Table 1). In stage four, a total of 510 respondents (caregivers of under-five children), 255 from each local government required for the study were selected from the households using systematic random sampling method.

***Data collection method***

 Quantitative data was collected using a validated semi-structured questionnaire divided into four sections which include:

* Section **A**: socio-demographic information
* Section **B**: knowledge about malaria
* Section **C**: malaria prevention and vector control practices
* Section **D**: history of malaria and current episode and treatment.

 The knowledge section comprised 11 questions with options. Each correct option was scored 1 and each wrong option was scored 0. There were a total of 20 correct options. Overall knowledge score was 20 and this was dichotomized into poor knowledge (1-10) and good knowledge (11-20).

**Table 1: The proportional allocation of sample size amongst selected communities**

|  |  |  |  |
| --- | --- | --- | --- |
| **LGA**  | **Communities** | **Formula for proportional allocation** | **Size Taken** |
| AKINYELE  | Olorisaoko  | \*No. of under-fives in Olorisaoko X sample sizeTotal N. of under-fives in Akinyele | 3811x2557340=132 |
| Akinyele  | \*No. of under-fives in Akinyele X sample sizeTotal N. of under-fives in Akinyele | 1611x2557340= 56 |
| Ikereku  | \*No. of under-fives in Ikereku X sample sizeTotal N. of under-fives in Akinyele | 1918x2557340=67 |
| **Total**  |  | **255** |
| LAGELU | Offa-Igbo  | \*No. of under-fives in Offa-Igbo X sample sizeTotal N. of under-fives in Lagelu | 5145x25512008=109 |
| Oyedeji  | \*No. of under-fives in Oyedeji X sample sizeTotal N. of under-fives in Lagelu | 3411x25512008=73 |
| Lalupon  | \*No. of under-fives in Lalupon X sample sizeTotal N. of under-fives in Lagelu | 3452x25512008 =73 |
| **Total**  |  | **255** |

**\*Population data obtained from local government council of each local government**

 The questionnaire was pre-tested in Oje, a community in Ibadan North local government area. In the pre-test, the questionnaire was administered to 10% of the sample size of the study population (i.e. 50 respondents). The Cronbach’s Alpha method was used to determine the reliability of the questionnaire. An Alpha coefficient above 0.5 was obtained; indicative of the reliability of the questionnaire. Certain amendments were also made on the questionnaire based on response to some of the questions.

 The questionnaire was administered to the mothers or caregivers of the under-five children after having obtained their consent to participate in the study. Mode of administration was interviewer’s method and was carried out by trained research assistants in the respondents’ local language.

***Ethical approval***

 Ethical approval was obtained from the UI/UCH university review board before the commencement of the study. Consent was obtained from the respective local government councils of the selected communities and the community leaders. Informed consent was obtained from each respondent.

***Data analysis***

 The questionnaire data was entered directly into and analyzed using the Statistical Package for Social Sciences (SPSS) version 15 for Analysis. Data were analysed using descriptive and inferential statistics at 5% level of significance.

**Results and Discussion**

***Socio-demographic characteristics of respondents***

 Respondents’ age ranged from 13 to 80 years with a mean of 31.6±10.1 years. The mean age of their under-five children was 25.2±16.9 months. A large number 242 (48.3%) of the respondents were within the 21-30 age range (Fig 2).

**Figure 2: Age distribution of respondents**

*Key: I(≤20 yrs.), II(21-30 yrs.), III(31-40 yrs.), IV(≥41 yrs.)*

 Table 2 shows that majority of the respondents 485 (96.8%) were married while only 4 (0.8%) were single and 12 (2.4%) were either divorced or separated from their spouses. About half of the respondents 253 (50.5%) practiced Christianity, 247 (49.3%) practiced Islam and only 1 (0.2%) of the respondents was a traditionalist. The Yoruba ethnic group was the highest with 408 (81.4%), followed by the Hausa 22 (4.4%), Igbos were 7 (1.4%) and others were 64 (12.8%). Almost half of the mothers (42.1%) had primary education as the highest level of education, 161 (32.1%) had secondary education, 113 (22.6%) had no formal education while only 16 (3.2%) had tertiary education. Among the fathers of the under-five children, 239 (47.8%) had secondary education, 142 (28.4%) had primary education, 79 (15.8%) had no formal education and 40 (8.0%) had tertiary education as their highest level of education. Major occupation among the mothers of the under-five children was trading 287 (59.2%) and for the fathers, major occupation was farming 158 (32.2%).

**Table 2: Socio-demographic characteristics of respondents and their under-five children/wards**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Demographic Characteristics | Category | AkinyeleN (%) | LageluN (%) | TotalN (%) |
| Child’s Age  | 0-12-5 | 72(28.2)183(71.8) | 81(32.9)165(67.1) | 153 (30.5%)348 (69.5%) |
| Child’s Sex | MaleFemale | 134(52.5)121(47.5) | 114(46.3)132(53.7) | 248 (49.5%)253 (50.5%) |
| Marital Status | SingleMarriedOthers | 1(0.4)249(97.6)5(2.0) | 3(1.2)236(95.9)7(2.8) | 4 (0.8%)485 (96.8%)12 (2.4%) |
| Religion | ChristianityIslamTraditional | 127(49.8)127(49.8)1(0.2) | 126(51.2)120(48.8)0(0.0) | 253 (50.5%)247 (49.3%)1 (0.2%) |
| Ethnicity | YorubaHausaIgboOthers | 189(74.1)18(7.1)5(2.0)43(16.9) | 219(89.0)4(1.6)2(0.8)21(8.5) | 408 (81.4%)22 (4.4%)7 (1.4%)64 (12.8%) |
| Respondent’s Educational Status | No formal educationPrimarySecondaryTertiary | 52(20.4)105(41.2)88(34.5)10(3.9) | 61(24.8)106(43.1)73(29.7)6(2.4) | 113 (22.6%)211 (42.1%)161 (32.1%)16 (3.2%) |
| Mother’s Occupation | TradingArtisanFarmingOthers | 147(60.7)23(9.5)35(14.5)37(15.3) | 140(57.6)44(18.1)40(16.5)19(26.7) | 287(59.2%)67 (13.8%)75 (15.5%)56 (11.5%) |

**Numbers in parentheses are percentages**

***Respondents’ knowledge of Malaria***

 Respondents’ overall mean knowledge score was 9.1±3.2. Table 3 shows the overall level of knowledge on malaria in each local government. The number of respondents with good knowledge on malaria was significantly higher in Lagelu 170 (69.1%) than in Akinyele 25 (9.8%) p=0.000. No significant relationship was found between respondents’ age and level of knowledge on malaria. There was also no significant relationship between respondents’ level of education and knowledge of malaria.

 None of the respondents in Akinyele and 105 (42.3%) in Lagelu had the knowledge that malaria was caused by the malaria parasite, however, a high proportion of respondents in Akinyele 207 (81.2%) and Lagelu 164 (66.7%) knew that malaria was transmitted by mosquitoes. Majority of the respondents, 240 (94.1%) in Akinyele and 240 (97.6%) in Lagelu knew that high body temperature was a symptom of malaria.

 Only 35 (13.7%) in Akinyele and 124 (50.4%) mentioned headache as a symptom, while 24 (9.4%) and 131 (53.3%) respondents in Akinyele and Lagelu respectively had the knowledge that shivering and sweating were symptoms of malaria (Table 3). The use of Chloroquine was considered appropriate treatment for malaria by 63 (24.7%) of the respondents in Akinyele and 172 (69.9%) of the respondents in Lagelu. Only few respondents, 32 (20.4%) in Akinyele and 46 (18.7%) in Lagelu, considered the use of ACT as appropriate treatment of malaria. A large proportion of respondents in Lagelu 68 (68.3%) considered herbal medicine as appropriate treatment for malaria while only a few 5 (2.0%) did so in Akinyele (Table 3).

**Table 3: Respondents’ knowledge of malaria symptoms, appropriate treatment and control**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variable** | **Akinyele (N=255)****Frequency (%)** | **Lagelu (N=246)****Frequency (%)** | **Total (N=501)****Frequency (%)** |
| **What are the symptoms for recognizing malaria?\*****\***High body temperatureDiarrhoea**\***HeadacheChild not playingYellow urine**\***AnaemiaCoughing**\***Shivering and sweating**\***Body aches | 240 (94.1)9 (3.5)35 (13.7)45 (17.6)38 (14.9)5 (2.0)16 (6.3)24 (9.4)9 (3.5) | 240 (97.6)44 (17.9)124 (50.4)121 (49.2)190 (77.2)29 (11.8)86 (35.0)131 (53.3)76 (30.9) | 480 (95.8)53 (10.6)159 (31.7)166 (33.1)228 (45.5)34 (6.8)102 (20.4)155 (30.9)85 (17.0) |
| **What kind of treatment do you consider appropriate for malaria?\***No treatment is necessaryTaking Chloroquine**\***Other anti-malarial e.g. ACTDiet changeReligious healingHerbal medicine**\***Go to the hospital/ clinic Paracetamol | 1 (0.4)63 (24.7)32 (12.5)52 (20.4)4 (1.6)5 (2.0)0 (0.0)17 (6.7) | 0 (0.0)172 (69.9)46 (18.7)26 (10.6)14 ( 5.7)168 (68.3)14 (5.7)5 (2.0) | 1 (0.2)235 (46.9)78 (15.6)78 (15.6)18 (3.6)173 (34.5)14 (2.8)22 (4.4) |
| **How can malaria be prevented?\***By using ITNUsing herbsDrugsAvoiding sunPrevent stagnant waterUsing mosquito repellentInsecticide spray | 120 (47.1)31 (12.2)52 (20.4)29 (11.4)34 (13.3)7 (2.7)52 (20.4) | 23 (9.3)138 (56.1)216 (87.8)123 (50.0)134 (54.5)36 (14.6)56 (22.8) | 143 (28.5)169 (33.7)268 (53.5)152 (30.3)168 (33.5)43 (8.6)108 (21.6) |

*\*Multiple responses \*Appropriate answers*

Furthermore, a large proportion of respondents 167 (65.5%) in Akinyele and 172 (69.9%) in Lagelu identified stagnant water as a factor that could encourage the spread of malaria. Likewise 80 (31.4%) of respondents in Akinyele and 185 (75.2%) in Lagelu identified overgrown bushes as a factor that encourages the spread of malaria. Very few of the respondents in Akinyele 11 (4.3%) and 1 (0.4%) had the knowledge that children under five years and women respectively are more susceptible to malaria; while in Lagelu, a larger proportion of respondents 141(57.3%) and 52 (21.1%) knew that children under five and pregnant women are more susceptible to malaria.

A large number of respondents in both Akinyele 228 (89.4%) and Lagelu 12 (52.0%) had the wrong impression that everybody was equally susceptible to malaria.

 The proportion of respondents that consider malaria to be serious was 245 (96.1%) in Akinyele and 219 (89.0%) in Lagelu. A large proportion 227 (89.0%) in Akinyele and 233 (94.7%) in Lagelu agreed that malaria could be prevented. Few respondents had knowledge of how malaria can be prevented. Accordingly, 120 (47.1%) respondents in Akinyele and 23 (9.3%) in Lagelu mentioned that malaria could be prevented using ITNs; 52 (20.4%) in Akinyele and 216 (87.8%) in Lagelu mentioned the use of drugs; 7(2.7%) respondents in Akinyele and 36 (14.6%) in Lagelu mentioned the use of mosquito repellents and 52 (20.4%) respondents in Akinyele and 56 (22.8%) in Lagelu reported the use of insecticide spray as a method of controlling malaria (Table 3).

 Respondents’ overall mean knowledge score was 9.1±3.2. Table 4 shows the overall level of knowledge on malaria in each local government. The proportion of respondents with good knowledge on malaria was significantly higher in Lagelu 170 (69.1%) than in Akinyele 25 (9.8%) p=0.000. No significant relationship was found between respondents’ age and level of knowledge on malaria. There was also no significant relationship between respondents’ level of education and knowledge of malaria.

**Table 4: Respondents’ level of knowledge on malaria**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **LGA** | **Respondents’ knowledge on malaria (%)** | **df** | **X2** | **p-value** |
| Poor knowledge | Good knowledge | Total |
| **Akinyele** | 230 (90.2%) | 25 (9.8%) | 255 (100.0) | 1 | 185.22 | 0.000 |
| **Lagelu** | 76 (30.9%) | 170 (69.1%) | 246 (100.0) |
| **Total** | 306 (61.1%) | 195 (38.9%) | 501(100.0%) |

 Knowledge of malaria is believed to be essential for the adequate use of preventive measures (Ouattara et al., 2011). This study shows that overall knowledge about malaria was generally low among the respondents or caregivers of under-five children in the communities. Level of knowledge was however observed to be higher in Lagelu than in Akinyele. Similar findings were reported by Ouattara et al., (2011) in rural communities of Cote d’Ivoire, where overall knowledge of malaria was high (90.8%).

 In the present study, the correct answer for the question, what causes malaria was ‘malaria parasite’ unlike other studies where ‘mosquito’ was acceptable. This led to majority of the respondents selecting ‘mosquito’ and very few selecting ‘malaria parasite’ as the cause of malaria. Other common causes mentioned by respondents were heat, polluted air and sunlight. Heat from scorching sun was also mentioned in a study conducted in a rural community in south-east Nigeria (Okeke and Okafor, 2008). On the other hand, a fewer number mentioned mosquitoes as being responsible for malaria transmission and this may be attributed to lack of knowledge that malaria could be transmitted from one person to another.

 Overall, the findings showed that respondents had good knowledge of the cause, and the seriousness of malaria and this is comparable to the findings reported by Kinung et al., (2010). However whilst Kinung et al., (2010) also reported a high level of knowledge about symptoms, prevention and treatment options, knowledge regarding these were poor in the present study. Many respondents still considered Chloroquine and herbal medicine as the most appropriate treatment for malaria. Few knew that pregnant women and children under five years were more susceptible to malaria than others. These knowledge gaps about malaria are indicative of the strong need for an educational intervention.

***Sanitary conditions and vector control practices***

 The most common method of waste disposal is heaping and burning 89 (34.9%) and 112 (45.5%), while the least practiced method is use of baskets 19 (7.5%) and use of dustbins 20 (8.1%) in both Akinyele and Lagelu respectively. The major source of water supply in both Akinyele 234 (91.8%) and Lagelu 211 (85.8%) is well water. Access to pipe-borne water was low, only 6 (2.4%) respondents in Akinyele and 1 (0.4%) in Lagelu had access to pipe-borne water. Water was most commonly stored in buckets in both Akinyele 148 (58.0%) and Lagelu 171 (69.5%). More respondents in Lagelu (47.6%) as against 17.6% in Akinyele stored water in clay pots.

 Majority of the houses in Akinyele 209 (81.9%) and Lagelu 227 (92.2%) were surrounded by bushes and most of the respondents 153 (60.0%) in Akinyele and 158 (64.2%) in Lagelu reported that they cleared the bushes once a month. Having open drainages around the house were reported by 112 (43.9%) of the respondents in Akinyele and 22 (8.9%) in Lagelu. Sanitary toilets were very few 34 (13.3%) in Akinyele and 15 (6.1%) in Lagelu. A large proportion of the respondents 184 (72.2%) in Akinyele and 212 (86.2%) in Lagelu reported the use of bush as toilet.

 The level of usage of the different types of control methods is shown in Fig. 3 below. Insecticides were used by more respondents in Lagelu 101 (41.1%) than in Akinyele. 82 (32.2%) while more respondents in Akinyele 115 (45.1%) than in Lagelu 13 (5.3%) used ITNs. Few respondents in both Akinyele 2 (0.8%) and Lagelu 23 (9.3%) use untreated bednets. However, a large proportion of respondents in Akinyele 112 (43.9%) and Lagelu 194 (78.9%) depended on mosquito coils as a preventive measure against malaria. A large proportion of respondents in Lagelu 197 (80.1%) made use of drugs while just a few did so in Akinyele 49 (19.2%). Herbs were used in Lagelu by 122 (49.6%) respondents and in Akinyele by 19 (7.5%). The other methods used by respondents were burning of orange and cassava peels 2 (0.8%) and 21 (8.5%); physical killing 8 (3.1%) and 28 (11.4%); window screening 6 (2.4%) and 29 (1.8%); door screening 3 (1.2%) and 67 (27.2%); environmental sanitation 46 (18.0%) and 189 (76.8%) in Akinyele and Lagelu respectively.



**Fig. 3: Malaria control methods commonly used by respondents**

 The study shows that the use of insecticide sprays and ITNs were not common practice. It has been demonstrated that people with good knowledge about malaria do take appropriate treatment and preventive measures (Khumbulani et al., 2009; Kinung hi et al., 2010). The poor control practices observed here may therefore be attributed to the poor level of knowledge and the inability to translate knowledge (where present) into practice due to other factors. It was observed that respondents generally preferred to use methods that were cheap or cost nothing in the control of malaria as was also reported by Oladepo et al. (2010). Noor et al. (2006) reported that in most communities, use of nets is lowest among the poorest. Therefore, cost may also be a reason for non-use of ITNs and insecticidal sprays.

**Conclusion**

 The study concludes that, intervention based on an integrated vector management approach involving education, environmental management and chemical control should be implemented in these communities and others of their kind across the country. In future, the distribution of insecticide treated nets should also be followed up by close monitoring to ensure their effective usage.

**Acknowledgements**

 The authors wish to express their profound gratitude to the University of Ibadan, Nigeria, for providing the senate grant to carry out this study. All the community heads, local government officials, household members and research assistants that contributed to the success of this study are also highly appreciated.

**References**

Kinung’hi, S.M., F. Mashauri, J.R. Mwanga, S.E. Nnko and G.M. Kaatano, et *al.* (2010). Knowledge, attitudes and practices about malaria among communities: comparing epidemic and non-epidemic prone communities of Muleba district, North-western Tanzania. *BMC Public Health* **10**, 395. doi:10.1186/1471-2458-10-395http:// www.biomedcentral.com/content/pdf/1471-2458-10- 395. p df.

Khumbulani, H.W., M.L.H. Mabaso, S. Kunene, D. Govender, and R. Maharaj, (2009). Community knowledge, attitudes and practices (KAP) on malaria in Swaziland: A country earmarked for malaria elimination**.** *Malaria Journal* **8**, 29. doi:10.1186/1475-2875-8-29. <http://www.malariajournal.com/content/8/1/29>.

Noor, A.M., J.A. Omumbo, A.A. Amin, D. Zurovac and R.W. Snow (2006). Wealth, mother’s education and physical access as determinants of retail sector net use in rural Kenya. *Malaria Journal* **5**, 5 doi:10.1186/1475-2875-5-5 [http://www.malariajournal.com/ content/5/1/5](http://www.malariajournal.com/%20%09content/5/1/5).

Okeke, T.A. and H.U. Okafor (2008). Perception and treatment seeking behaviour for malaria in rural Nigeria: implications for control. *J. Hum. Ecol.* **24** (3), 215-222.

Oladepo, O., G.O. Tona F.O. Oshiname and M.A. Titiloye (2010). Malaria knowledge and agricultural practices that promote mosquito breeding in two rural farming communities in Oyo state, Nigeria. *Malaria Journal* **9**, 91 doi:10.1186/1475-2875-9-91 <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2856588/>.

Ouattara, A.F., G. Raso, C.V.A. Edi, J. Utzinger and M. Tanner et *al*. (2011). Malaria Knowledge and long-lasting insecticidal net use in rural communities of central Cote d’Ivoire. *Malaria Journal* **10**, 288. doi:10.1186/1475-2875-10-288 [http://www.malariajournal.com/ content/ 10/1/288](http://www.malariajournal.com/%20%09content/%2010/1/288).