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Original Article

MALARIA PREVALENCE: INFLUENCE OF COMMUNAL KNOWLEDGE AND PRACTICES POST IRS INTERVENTION IN EPE, SOUTHWEST, NIGERIA

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ABSTRACT

Malaria still remains a major public health in Nigeria despite interventions that are in place. This study aims to evaluate the impact of the local community's Knowledge Attitudes and Practices (KAP) and the impact of Indoor Residual Spraying (IRS) exercise in Epe community.

Malaria rapid testing was used to determine the prevalence of malaria from a total of 252 participants. Structured questionnaires were administered to 252 randomly selected households to obtain information on malaria related KAP. Hospital data relating to malaria outpatient/inpatient visits were perused from the community health facilities.

The overall prevalence of malaria was 36.11%. There was a significant difference in the prevalence of malaria between participants with appropriate information about malaria and participants without appropriate information ($p<0.05$). The frequency of hospital visits due to malaria between the pre-IRS and post IRS periods was insignificant ($p>0.05$). The proportion (53.98%) of the households whom their houses were not sprayed may contribute to the mild impact of IRS observed.

The persistence of malaria among participants with low KAP and the households who are not beneficiary of the concluded IRS exercise cannot be over-emphasized. The need for intensification of malaria awareness programmes, surveillance and proper allocation of interventions are advocated.

Keywords: Indoor Residual Spray, Households, Knowledge Attitudes Practices, Hospital visits

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INTRODUCTION

Malaria is an entirely preventable and treatable mosquito-borne illness, caused by a protozoan parasite, the Plasmodium species (WHO, 2015). The female Anopheles mosquitoes are the vectors, responsible for transmitting the parasites. The larvae of Anopheles occur in a wide range of habitat but most species prefer clean, unpolluted water including fresh or salt water, marsh, mangrove swamps, rice fields, stream edges and rivers (Centers for Diseases Control and Prevention [CDC], 2015).

There was an estimated 198 million cases of malaria, which resulted to an estimated 584,000 deaths occurring worldwide in 2013. About 90% of these deaths occurred in African countries, with the Democratic Republic of Congo (DRC) and Nigeria alone accounting for 39% of global malaria deaths (WHO, 2015). Malaria remains a major public health problem in Nigeria and remains one of the leading causes of morbidity and mortality (National Malaria Control Programme [NMCP], 2013), and it is responsible for 29% of childhood death, 25% of infant mortality and 11% of maternal mortality (Lagos State Ministry of Health [LSMH], 2015).

Malaria has the greatest prevalence in the South West (Lagos State included), North Central, and North West regions (Malaria Indicator Survey [MIS], 2010). In a recent study by Onwuemele, 2014, malaria prevalence in Nigeria has been estimated to be as high as between 80 to 85%. In Lagos State, malaria is responsible for 70% of outpatient attendance at the secondary healthcare facilities and over 80% of all tracer diseases reported by primary health facilities (LSMH, 2015). Another study conducted in Lagos, showed that malaria accounted for 30% hospital admission and 60% of the total outpatient visits to Lagos hospitals (Bodwin, 2014).

The most recent documented study on malaria prevalence in school children in Epe was carried out in 1971 (Okpala, 1971). Epe is one of the 18 sentinel sites proposed by National Malaria Elimination Programme (NMEP). Epe was also selected to represent the Southwestern region for the entomological surveillance exercise that was to be carried out in 2014 (Chukwuma, 2014). In addition, IRS exercise was recently (2014) carried out by the State Government health workers in Epe community. However, human inappropriate behaviour and/or incorrect beliefs are capable of jeopardizing the success of these laudable control strategies (Deressa *et al.,* 2000). A sound local understanding of malaria, preventive measures and health seeking behaviour is crucial for malaria control (Esse *et al.,* 2008). This can be achieved through prompt and regular malaria survey by assessing communal Knowledge, Attitude and Practices (KAP) in relation to malaria.

The present study was designed to assess communal knowledge with respect to the adopted prevention and management practices and the impact of the 2014 IRS exercise in relation to malaria prevalence in Epe community.

MATERIALS AND METHODS

Study area and location

Epe is a Local Government Area (LGA) of Lagos State in the southwestern part of Nigeria. Epe has a population of 181, 409 (2006 Census). The climate is tropical with two distinct seasons, the rainy (March – October) and dry (October – February). The environmental conditions in Epe are characterized by open gutters, swampy soil, thick grasses, stagnant pools, marshy soils, varying numbers of large rivers (Wikipedia, 2014).

Ethical consideration

Ethical approval to undertake this study was obtained from the State Ministry of Health, Lagos State Secretariat, Alausa, Ikeja. Permission to carry out the study was obtained from relevant

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authorities in Epe Local Government, Epe General Hospital and Primary Health center, Epe and the two community Heads. The objectives of the study were explained to the study participants after which informed consents were given.

Study design and sample size determination

The sample size was calculated for questionnaire administration, using the following equation: $n=Z^2 P (1-P)/d^2$. *Where n = sample size, Z = 95% confidence interval (1.96), P = expected prevalence (80%) and d = precision or margin of error (5%)* (Naing *et al*, 2006). Since there was no reported malaria prevalence in Epe, a prevalence of 80% estimated for Lagos State (LSMH, 2015), was used as the expected prevalence. Participants were randomly selected from among outpatients who visited the health centres during the period of the study (August – September, 2014).

Oral interview and blood sample collection

Capillary blood samples were obtained from the left thumb of a total of 252 participants for rapid malaria testing using finger prick method with the assistance of hospital health workers. Oral interview was conducted for all consenting participants. Information obtained included knowledge about malaria, treatment seeking behaviours, personal protective measures used against malaria among others.

Rapid diagnosis of malaria and drug administration

Standard procedures were used for malaria rapid testing according to MIS (2013) recommendations. Care Starter *Plasmodium falciparum* Histidine Rich Protein 2 [*P.f* HRP2] Rapid Diagnostic Test (RDT) kit was used to test for malaria parasites according to the manufacturer's instructions. Participants that tested positive (Figure 1) for malaria were referred to physicians/consultants at the community health centre.

Questionnaire Administration and retrospective studies

Pretested and structured questionnaires were administered to each of the 252 randomly selected households. The interviewees were the heads of the household preferably the mother, then father. The questionnaires were designed to solicit information on the household financial status,

Knowledge about malaria, treatment and treatment seeking behaviour, ownership and usage of personal protections, beneficiary of the concluded IRS exercise by the State Government health officials/workers. The annual malaria statistics on inpatients/outpatients hospital visits between 2013 and 2014 were obtained from the statistics unit of the community health centres.

Data analysis

Data collected from questionnaire and other data collected including the results of rapid malaria testing were analysed using Microsoft Excel Office 2007 version software**.** Chi-square ($\chi 2$**)** was used to analyse findings at 5% significant level. The prevalence of malaria infections among the study participants was determined. The frequency of hospital admission and outpatient visit between 2013 and 2014 were estimated from hospital records and data obtained were also computed and analysed.

RESULTS

Hospital Visits to Epe Primary Health Center (Ephc) and Malaria Cases

Out of a total of 1,751 patients that visited EPHC between July, 2014 and October, 2014, 816 (46.6%) were malaria patients, of which 319 (39.1%) had complicated malaria made up of 292 (35.8%) and 27(3.3%) infancy malaria and pregnancy malaria respectively. The remaining 497(60.9%) being uncomplicated malaria

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Prevalence and Knowledge of Malaria

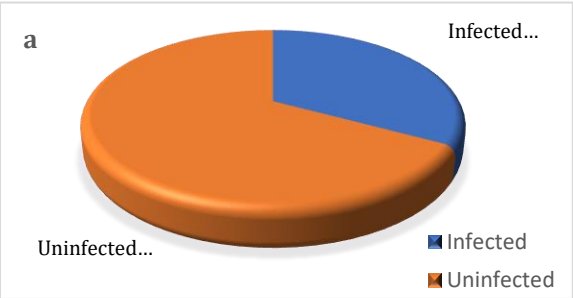
The overall prevalence of malaria this present study was 36.1%, showing that out of a total of 252 consenting participants, 91 were positive for malaria parasites. The break down showed that a total of 35(48.6%) and 56(31.1%) participants tested positive out of the 72 and 180 participants enrolled in August and September respectively.

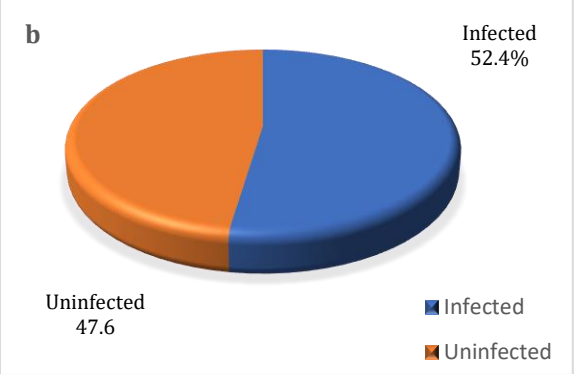
Two hundred and ten (210) respondents at Epe General Hospital (EGH) had appropriate information about malaria prevention and treatment while the remaining 42 participants had poor knowledge. Among these respondents with appropriate information about malaria prevention

and treatment, 69 (32.9%) tested positive while 22 (52.4%) out of those that had poor knowledge about malaria prevention and treatment tested positive to malaria (Figure 1). The proportion of participants with poor knowledge that had malaria was significantly higher (69.1%) than the proportion of those participants with good knowledge (34.3%), df=1; X^2 =5.71; p<0.05.

Knowledge About Malaria Transmission

Among the 252 outpatients interviewed at EPHC concerning their knowledge about malaria transmission, 210 (83.3%) respondents knew that malaria is an infectious disease that is transmitted by the bite of a mosquito. However, the remaining 42(16.67%) of the interviewed participants still have the erroneous belief that malaria is caused by drinking dirty water or by staying too long under the sun or by witchcrafts activities.





a. Participant with good knowledge
b. Participant with poor knowledge

Figure 1: Malaria prevalence in relation to knowledge about malaria treatment and prevention.

Malaria Education, Information and Communication

Household census on malaria awareness - Two hundred and forty (95.24%) respondents reported awareness of malaria while the remaining 12 respondents reported unawareness of malaria.

However, a significant percentage (73.01%) of the households desired to have more malaria related information. A total of 61 (25.42%) of the 240 household heads that reported malaria awareness had malaria in the last one year.

Household Census on the cause of malaria - A total of 217 (86.11%) household respondents had appropriate knowledge about the cause of malaria while the other 35 (13.89%) respondents had inappropriate knowledge. Out of the 217 household heads that had appropriate knowledge about the cause of malaria, 53 (24.42%) households reported that more than half of their members had malaria episodes in the last one year while 13 (37.14%) out of the total 35 household heads that had inappropriate knowledge had more

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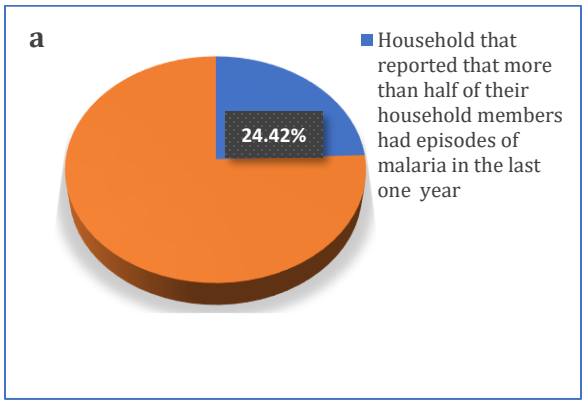
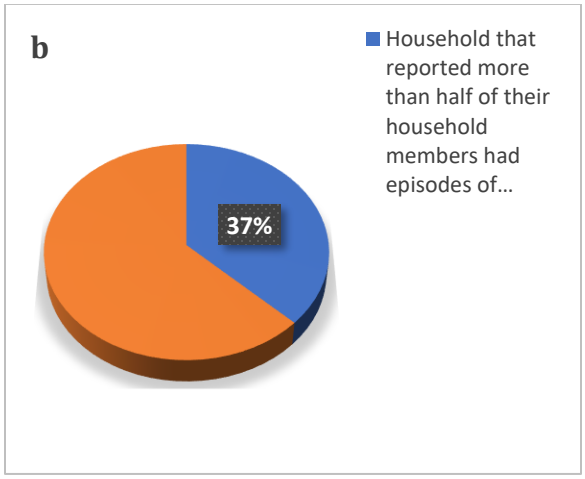
than half of their members infected (Figure 2). However, there was no significant difference in the number of malaria episodes among households with appropriate knowledge about the cause of malaria and households with inappropriate knowledge (df=1; $X^2 = 0.45$; $p > 0.05$).



a. Household heads that had appropriate knowledge about the cause of malaria.



b. Household heads that had inappropriate knowledge about the cause of malaria.

Figure 2: Household reports >50% and =50 % members with malaria episodes.

Malaria treatment

Treatment seeking behaviour: A total of 171 (67.86%) respondents sought malaria treatment in designated healthcare facilities while 67(26.59%) respondents visited pharmacists in medicine stores with only 5(1.98%) visiting traditional healers for treatment while 6(2.38%) practice self-medication using either herbal remedy or orthodox or both and the others claimed not to seek treatment at all (Figure 3). Malaria history among participants who visited designated health centres for treatment was low (25.75%) when compared with 50% or 60% for those who practiced self-medication or visited traditional healers respectively.

Awareness of recommended drug: A total of 102 (40.48%) participants knew that Artemisinin based Combination Therapy (ACT) is the current recommended drug therapy for proper and prompt treatment of malaria.

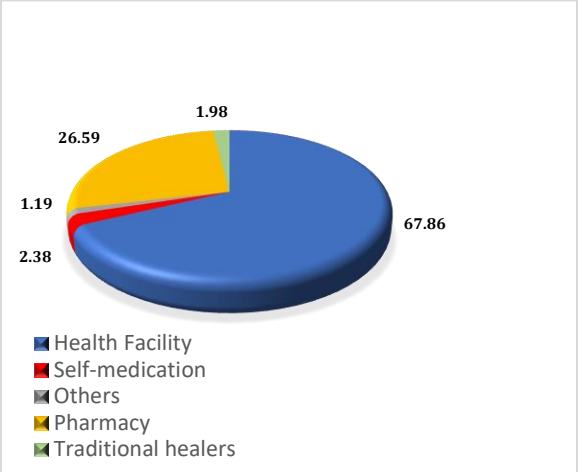


Figure 3: Types of malaria treatment approach among participants

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Usage of treated bed nets for personal protection against malaria

A large percentage 213 (84.53%) of the household heads believe malaria can be prevented. One hundred and ninety 190 (75.40%) households own at least two Insecticide Treated Nets (ITNs) while 32 households do not have ITN. A total of 42 (22.11%) and 22 (35.48%) households that had at least two bed nets and households that did not have bed nets respectively; had malaria in the last one year. There was a significant difference in malaria cases in relation to bednets ownership among participants.

Assessment of The Indoor Residual spraying (IRS) Exercise

Household participation status: A total of 112(44.44%) participants claimed that their households were sprayed during the concluded IRS exercise in Epe locality while insignificantly higher proportion of the respondents (53.98%) claimed that their households were not sprayed. The remaining 1.58% were ignorant of the exercise taking place and were unavailable during the spraying exercise.

Hospital visits in EGH Pre- and Post-IRS exercise: The total of hospital visits in EGH between 2010 and 2014 was 88,251. The total number of malaria cases 50130 (56.80%) was higher than the sum of all other visits 38,121 (43.20%), due to other ailments (Table 1). The IRS exercise was carried out in Epe community in the first quarter of the year (2014). The total hospital visits recorded at EGH in 2014 when the IRS exercise was conducted was 18,937 (out which malaria cases constituted 11,070), which was lower than recorded visits, 23,234 (out of which malaria cases constituted 14,614) in the preceding year (2013). Following the conduct of IRS, the total malaria cases reported at EGH dropped from 62.9% in 2013 to 58.5% in 2014 (df=1, χ_2 = 0.01; P > 0.05) (Figure 4). However, the reduction was not statistically significant.

Table 1: Hospital visits to EGH from 2010 – 2014

Cause of visit	Number (%)
Malaria	50,130 (56.80)
Non-malaria	38,121 (43.20)
Total	**88,251 (100)**

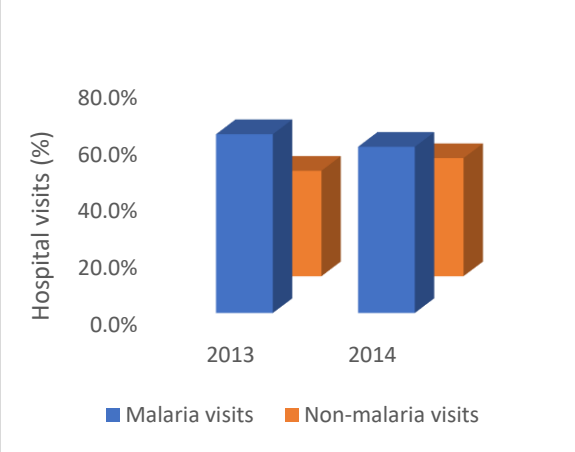

Figure 4: Total malaria cases before and after Indoor Residual Spray exercise. Malaria visits Non-malaria visits

DISCUSSION

Human behavioural traits in highly endemic malarious areas are particularly relevant to understanding the cause of continuous exposure to malaria parasites. The prevalence of malaria (40.1%) in the present study was less than the overall 60% prevalence reported for Lagos State in recent times which confirm the significance of correct intervention strategy. The concluded IRS exercise in the community during the first quarter of year 2014 may have influenced the observed reduced prevalence in the present study.

Improved community knowledge of malaria and the source of transmission was reported to promote personal preventive and protective

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practices among affected communities in a study reported by Tatem *et al.* (2010). The lower prevalence (34.29%) observed among participants with good knowledge about malaria prevention and treatment compared with those with poor knowledge (69.05%) is an indication that community's attitudes and beliefs regarding malaria treatment and treatment seeking behaviour had significant influence on the burden of disease induced by malaria as explained by Tatem *et al.* (2010) and Olorunniyi and Morenikeji (2013). The wide acceptance (84.13%) of mosquito bites as the cause of malaria may be attributed to higher access to the media and availability and use of modern health facilities in the community. High level of knowledge about malaria was also reported in Lagos city and Ekiti state where malaria prevalences were found to be low (Okwa and Ibidapo, 2010; Olorunniyi and Morenikeji, 2013).

According to Lagos State Ministry of Health, LSMH (2015), recommended efforts at malaria control globally were targeted towards the use of Insecticide Treated Nets (ITNs) and IRS for prevention against mosquito bite. However, compliance with these recommendations was observed not to be total in the study area. The possession of at least two ITNs by 75.40% of the households out of which 82.87% claimed to use the nets at night was an improvement on the

observation reported in Ile Ife, another town in southwestern Nigerian by Erhun *et al*, (2005). These authors reported that only 3.3% of the participants prefer the use of ITNs as method of malaria prevention. The observation in Epe during this study is an encouraging evidence of an informed population and suggests a possible subsequent prevention of malaria transmission following persistent use of available interventions in the area. The availability of large quantities of recommended antimalaria drugs (artemisinin based combination therapy), rapid diagnostic testing kits, hand gloves and ITNs at the health facilities coupled with the concluded IRS exercise in the community as required is significant and commendable. The commitment of the Roll Back Malaria intervention programmes and government efforts towards reducing the burden of malaria in Nigeria by the year 2020 must have enhanced the involvement of the Local Government Area in malaria control.

The drop-in hospital visits due to malaria after the IRS exercise compared with the preceding year is similar to the findings of a previous study carried out in India where there was considerable reduction in vector density, parity rates and malaria cases in ICON 10CS-sprayed villages (Raghavendra *et al.,* 2011). This observed reduction in the number of malaria cases recorded after IRS exercise in Epe could also be attributed to the efficacy of lambda-cyhalothrin (ICON 10CS) chemical used during the spraying exercise. The low proportion of households whom their houses were not sprayed during the exercise could be perceived from two different angles. First, on the part of the healthworkers and spraymen, who probably did not come around when household members were around and secondly, on the part of the community where the household members were not around when the spraymen called. Notably, the healthcare officials reported low compliance and lack of cooperation on the part of the population inspite of prior sensitization of household heads of the impending exercise, while, the community members complained of prolonged unnecessary delay or no show by the health workers. Sensitization programmes obviously

must be based on the peculiarity of different localities for a meaningful impact and successful intervention exercise. The experience from the present study suggests inadequacies in the planning and execution of the intervention, which could have recorded hundred percent coverage.

Malaria was responsible for 52.73% outpatient visits to Epe General Hospital and an estimated 12.9% mortality recorded in the hospital between 2010 and 2014 (adopted from Epe General Hospital Data). This showed that malaria transmission continually, in the sentinel

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community and the burden of the disease cannot be over-emphasized especially because of repeated and several interventions over the years which seem not to yield desired impact. However, the significant fall in prevalence in the year of intervention and the issue of community involvement as stakeholder in intervention programme is potential evidence of possible elimination of malaria burden in the future subject to the maintenance of a significant level of periodic adequate intervention. Malaria treatment approaches are grouped based on three categorical levels; the first, at designated health facilities and includes hospitals, clinics, dispensaries. Second is the involvement of private practitioners and village healthcare workers, and third is self-treatment including both herbal treatment and pharmaceutical/antibiotics use (McCombie, 1996). This study indicated that a significant proportion of the participants sought treatment in designated health facilities, in line with standard treatment modalties and goes a long way to further confirm the possibility of behavioural impact in the successful limitation of malaria persistence.

CONCLUSIONS

The finding of the present study is a confirmation of the fact that the community has appropriate information about the significance of malaria burden and might possibly explain the reduction in prevalence of malaria during this study. Furthermore, the higher malaria prevalence recorded among participants with poor knowledge about malaria compared to those with good knowledge cannot be over-emphasized. The continuous exposure to malaria in the community may be attributed to inadequate knowledge about malaria control, the non-compliance of the community in adoption of interventions and inadequate implementations of planned intervention. All stakeholders in the proper execution of future intervention should show intensified concern and determined commitment to the cause. In addition, malaria surveillance/mapping is also recommended in order to ensure timely interventions and cost effective control.

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