

*Full Length Research Paper*

# The prevalence of head lice (*Pediculus humanus capitus*) and bed bugs (*Cimex hemipterus*) in selected human settlement areas in Southwest, Lagos State, Nigeria

Omolade O. Okwa<sup>1\*</sup> and Olusola A. Ojo Omoniyi<sup>2</sup>

<sup>1</sup>Department of Zoology, Faculty of Science, Lagos State University, Nigeria.

<sup>2</sup>Department of Microbiology, Faculty of Science, Lagos State University, Nigeria.

Accepted 5 January, 2010

The current study is to evaluate the prevalence and intensity of common ectoparasites (*Pediculus humanus capitus* (Head lice) and *Cimex hemipterus* (Bedbugs) in selected areas in Lagos, Southwest Nigeria between July and December, 2008. Five areas in Lagos State, Nigeria (Ojo, Mushin, Ikorodu, Badagry and Ajeromi) were randomly sampled and included in the study for the occurrence of human Head lice and Bed bugs. In each of the 5 locations, 200 randomly selected students participated for lice survey. Similarly, 40 households (HH) in each location participated on the bedbug's survey. Head lice were collected by examination of hair and then combing hair using diluted Dettol. Bedbugs were handpicked from mattresses, cracks/crevices of walls and furniture. Overall, 88 of the 1000 (8.8%) respondents had lice from 4 of the 5 schools surveyed. Only, Mushin (26) and Ajeromi (23) areas reported the occurrence of bedbugs. Head lice and bed bugs occurred in impoverished sub-urban slum locations. Public health and sanitation situation of slum locations like Mushin and Ajeromi needs to be improved for the effective prevention and control of ectoparasites.

**Key words:** Bed bugs, head lice, Lagos, prevalence.

## INTRODUCTION

Lagos State is the former capital and a commercial nerve centre of Nigeria. It therefore attracts migrants from all over Nigeria and beyond. As the smallest State in Nigeria, it is densely populated and this impacts on the Human health as well, because of poor hygiene and sanitation. Mathew (1998), reported that lousiness is associated with deprivation, intimate associations imposed by overcrowding and its aftermath.

Human ectoparasites are organisms that pose great public health significance in densely populated, overcrowded communities. They live on the skin surface of a bigger organism called the host and are dependent on the host for food, shelter and other basic requirements. Being prolific blood suckers, they have direct effects on

their host; they may also act as vectors and or reservoirs in the transmission of pathogens of several infections to their host, serving as vectors of diseases in both man and animals (Parola and Raoult, 2001). Other negative effects of these ectoparasites on human host include irritation leading to scratching, allergic reactions, and restlessness (Sangwan et al., 2000). Their bites may cause inflammation and itching. They also transmit diseases to their host. In humans, lice transmit typhus, relapsing fever, trench fever and skin infections. These have been reported in the past by Rechav and Nuttall (2000).

These organisms are arthropods belonging to the Class Insecta and are the main ectoparasites of medical significance. In humans, the most common ectoparasites include Head lice and Bedbugs which are macroscopic. These both are haematophagous and this has serious medical implications (Kaaya et al., 2000; Wilkel, 1999). Others Arachnids like ticks, fleas, mites, and jiggers (*Tunga penetrans*) are equally important ectoparasites of man

\*Corresponding author. E-mail: [okwaomolade@hotmail.com](mailto:okwaomolade@hotmail.com).  
[Omolade.okwa@lasunigeria.org](mailto:Omolade.okwa@lasunigeria.org). Tel.: 08028313362.

although they tend to receive less attention (Kaaya et al., 2000; Rechav and Nutall, 2000; Sangwan et al., 2000).

The human Head louse (*Pediculus humanus capitus*) belongs to the Order Anoplura, which are dorso-ventrally flattened, wingless insects with clawed legs (Yoloye, 1994). They are common ectoparasites of humans throughout the world (Molyneux, 1993). They have hemimetabolous life cycle, spending their entire life cycle on host, as permanent obligatory ectoparasites (Ko and Elston, 2004). They have mouthparts for piercing and sucking and use their curved clawed digits for clinging to the host. They attach to the hair strands on the head where they suck blood and lays eggs (nits) (Oyerinde, 1999). Temporarily, the head lice may survive in clothing, bed linens, combs, brushes and hats (Matthews, 1998). Young Children and teenagers are at greater risk of contacting head lice infestation because they are predisposed to exchanging personal effects (Jellife and Stanfield, 1978). Absence of the head lice from a host rapidly results in death. They do not show marked seasonality as they depend on the host body temperature to develop and hatch (Oyerinde, 1999).

Lice are host specific and show predilection for a particular site, for example, the Pubic or Crab louse (*Phthirus pubis*), causing Pthiriasis, resides in the pubic hair (Altschuler, 2002, Anderson and Chaney, 2009). The body louse *Pediculus humanus humanus* resides in other hairy places in the body, folds in clothing and occasionally in the facial hair and eyelashes where they cause itching (Rozsa, 1997, Pollack, 1997).

Bedbugs (*Cimex hemipterus* (tropical) and *Cimex lectularis*) (cosmopolitan) are members of the Order Hemipteran. They are pale brown, wingless insects with flattened oval shaped bodies and have clawed walking legs. Bed bugs have hemimetabolous life cycle, the nymphs are similar but paler and also suck blood. Like head lice, the mouthparts are also modified for piecing and sucking. They are found within human housing units and especially behind wallpapers, seams of mattresses, in beds and other, cracks and crevices of furniture where they stay in close contact with each other (Oyerinde, 1999). They are most prevalent in overcrowded and squalid conditions such as those in slums, some schools, refugee camps, police cells and prisons and cheap poorly managed hotel rooms (Wilkel, 1999).

Bedbugs are not known to transmit any diseases but are really a nuisance since they cause loss of sleep, allergic skin reactions, red spots, papular spots (small clusters of extremely pruritic, erythematous papules or wheals representing repeated feeding by a single bug), urticaria, blistering, excoriation of skin and nervous breakdown (Elsto and Stockwell, 2000). Bed bugs introduces venom before sucking blood and this causes itching, burning and swelling in variable degrees depending on the individual susceptibility (Mathew, 1998).

Few studies have existed documenting human ectoparasites occurrence in Lagos (Ejecie, 1981). The present study was designed to estimate the prevalence and inten-

sity of common ectoparasites (Head lice and Bed-bugs) in a few selected areas of Lagos State, Nigeria and their significance. The two epidemiologic indices (prevalence and intensity) measures accurately infection parameters. This could provide data for a mathematically based theoretical framework to aid in the interpretation of field and experimental observations. Health education was also imparted by creating awareness in this study.

## MATERIALS AND METHODS

### Study area

Lagos State is located in Southwestern Nigeria, West Africa. Lagos has a surface area size of 3,577 square kilometers, of which 22% (787 sq.m) is made of lagoons and creeks. It is bordered by the Atlantic Ocean southerly, so it's a State of aquatic splendor. It is a highly urbanized state with economic and sociopolitical importance and there is also a high rate of rural-urban migration with a continuous surge in demand for housing. It therefore has many settlements which are densely populated. Lagos has two seasons called the rainy and dry season as rainfall is the real climatic variable. The rainy season is from April- October (7months with 1000 - 1500 mm of rain) while the dry season runs from November - March (5 months with 250 - 500 mm of rain). Temperature ranges from 25 - 27.5°C in the dry season and 17.5 - 20°C in the rainy season with mean relative humidity of 78%. The Southwest winds are warm and collects moisture from the ocean in the rainy season but the dry season is caused by north east winds which are cold and dry blowing across the Sahara desert from North Africa (Orebanjo et al., 1990) There is a slight break in late July and the month of August. June and July receive heavy rains causing swampy and flooding environments. December - January is the harmattan period with dry cold breeze. February is the hottest month in Lagos. This climatic condition has a big influence on the occurrence of parasites.

### Selection of the study sites

The survey was carried out within Ojo, Ikorodu, Mushin, Badagry and Ajeromi Sub-urban areas of Lagos State. Ojo and Badagry are located to the east of Lagos eastward; Mushin and Ajeromi are to the north central while Ikorodu is in the North West. Mushin and Ajeromi areas had particularly large populations and most inhabitants live in congested housing units and rooms. House types are a room and parlour attachment with shared kitchen, toilet and bathroom facilities.

Within the selected sub-urban locations, 40 households (HH) were randomly selected from a sampling frame consisting of all HH in the area. In total, there were a total of 200 HH. In each of the 5 sub-urban localities studied, a school was chosen from where 200 students were randomly selected from a list of all lower primary students aged 6 - 12 year. Prior consent was taken from the concerned school authorities.

### Data collection

#### Head lice survey

Head lice were collected from July - December, 2008. Information on the occurrence of lice was collected from the 1000 respondents, twice a month. Each of them had the heads carefully examined front of each respondent, after applying diluted Dettol (antiseptic

**Table 1.** The occurrence of Head lice and bedbugs in five different areas of Lagos, Nigeria.

| Sub-urban studied | Head lice/(HH)/sub-urban | Total Lice/head/person | Bedbugs/(HH)/sub-urban | Bedbugs/(Bed)sub-urban |
|-------------------|--------------------------|------------------------|------------------------|------------------------|
| Ojo               | 0                        | 0                      | 0                      | 0                      |
| Badagry           | 5/200 (2.5%)             | 14 (15.9%)             | 0                      | 0                      |
| Mushin            | 10/200 (5%)              | 34 (38.6%)             | 10/40 25%              | 26 (53.1%)             |
| Ajeromi           | 8/200 (4%)               | 30 (34.0%)             | 8/40 20%               | 23 (46.9%)             |
| Ikorodu           | 4/200 (2%)               | 10 (11.36%)            | 0                      | 0                      |
| Total             | 27/1000 (2.7%)           | 88                     | 18/200 (9%)            | 49                     |

Df = 4 P < 0.05 Differences in prevalence between areas are significant. HH (household).

and disinfectant) to their hair. The product obtained from each participant's hair was examined microscopically and visually (Yoloye, 1994). After combing hairs, any crawling insect with fused thoracic segment, abdomen having large pleura which is expanded in the fed ones and curved claws for clinging to host was identified as head lice. Further examination identified three pairs of walking legs. The cuticle appears leathery and the lateral area of abdomen black in colour. They measured 2.5 - 4.5 mm. Microscopically, the Head lice had short antennae with segments and simple eyes. The abdomen has abdominal spicules on the 5<sup>th</sup> and 7<sup>th</sup> segments and pleural plates on the 9<sup>th</sup> segment. The head lice were counted individually. The collected lice were preserved in properly labelled specimen bottles containing 70% alcohol for preservation.

#### **Bedbugs survey**

Bed bugs were collected from July - December, 2008, twice a month, alternating with head lice survey. In each of the 5 sub-urban areas, the selected 40 HH were visited to collect information on presence of bed bugs. Prior consent of the household heads was taken for the inspection of their housing units. Bed bugs were checked by searching mattresses, cracks and crevices of walls and furniture (Settees, armchairs and Cane chairs). When Bed bugs were present, they were handpicked using rubber hand gloves and broomsticks. Based on the identification by Yoloye 1994, visually, the bedbugs were corneous with three pairs of clawed walking legs and offensive smell. They were 6 - 8 mm long. Microscopically, the bedbugs were characterized by a flat sunken head with rostrum, a

vestigial forewing on the metathorax and rounded abdomen with nine segments further identified the bed bugs. They were picked antenna with very tender 3<sup>rd</sup> and 4<sup>th</sup> segment and a compound eye. from 40 dwellings randomly selected in each local government area (200 dwellings in all). The bed bugs were preserved in properly labelled specimen containing 70% alcohol.

#### **Data analysis**

The prevalence of Head lice was expressed as the percentage of number of individual with head lice per population sampled. The prevalence of bedbugs was expressed as the percentage of number of bedbugs found per number of human dwelling sampled. The number of ectoparasites collected was used to estimate the intensity of infection. Intensity was estimated by direct counting (Anderson, 2004). Total intensity was the sum of all intensities recorded in the population of an area. Chi Square was used to calculate the differences that exist in prevalence rates at 0.05 alpha.

#### **Health education**

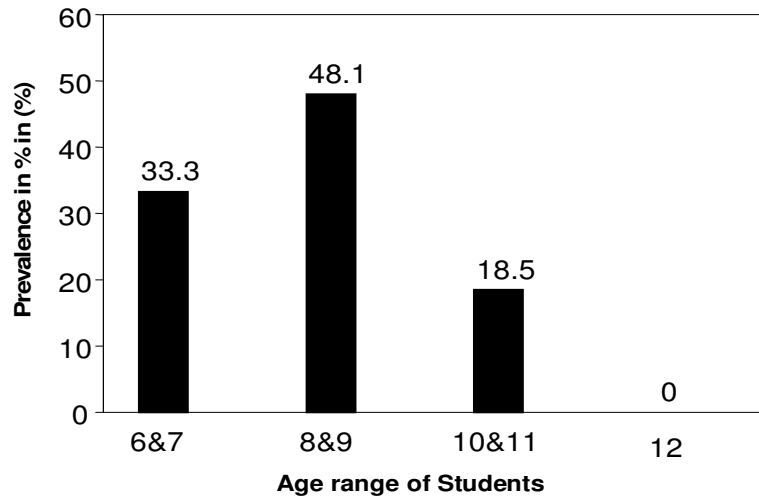
After the Survey, the inhabitants of the human dwellings and schools visited were educated on how best to eliminate the ectoparasites and prevent against future infestations. Pictorials and slide shows were the methods used in conveying this enlightenment to the participants. They gave information on the morphology, mode of infes-

tation, prevention and control of head lice and Bedbug.

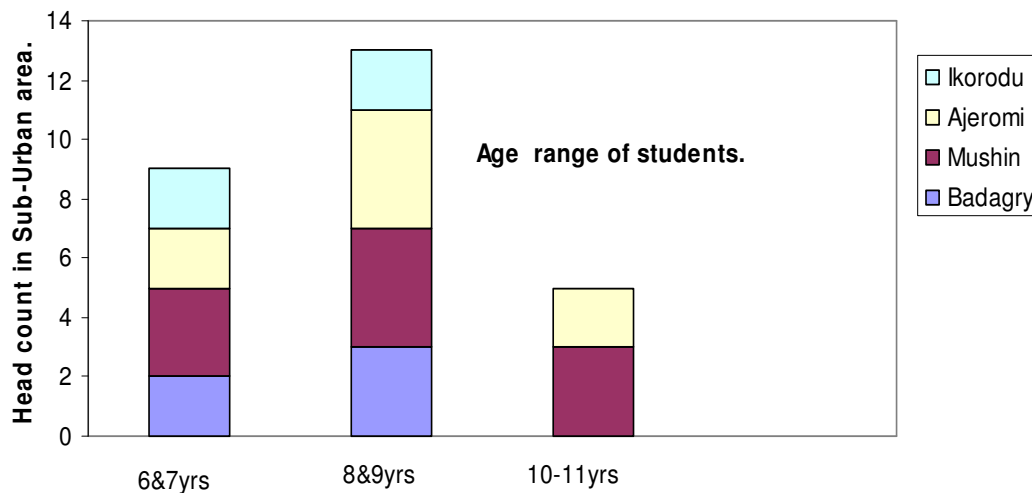
## **RESULTS**

### **Head lice**

Head lice were observed in the students of 4 of the 5 schools surveyed. The other four areas had Head lice. Only the students of the Lagos State University (LASU) Staff School in Ojo area were not infested by lice. Twenty seven (27) students of the 1000 investigated, had lice on their heads. Overall, 88 Head lice were recovered during the survey (Table 1). The highest prevalence and intensity of Head lice was reported in Mushin area. In this area, 10 out of 200 participants (5%) infested with lice and from them 34 of the 88 lice were recovered (Table 1 and Figure 2). This was followed by Ajeromi with 8 of the 200 (4%) participant investigated being infested by lice. Lice recovered from Ajeromi represented 34% of the total 88 lice collected. No significant differences at 0.05% exist in the prevalence of Head lice in these two areas. Intensities increased with prevalence in both areas. Participants aged 8 - 9 had the highest prevalence of head lice (48.1%) while students age 12 and beyond, had no Head lice in the five areas (Figures 1 and 2). The overall pre-



**Figure 1.** The Age range of respondents and prevalence of head lice infestation in the FOUR sub-urban areas of Lagos.



**Figure 2.** The age range of participants with headlice in the four sub-urban areas.

valence of Participants with Head lice was 20.7%.

### Bedbugs

Only 9% (18/200) of the surveyed HH, 10 in Mushin and another 8 in Ajeromi, were infested with Bed bugs (Table 1). The other 182 HH spread across 3 other surveyed areas lacked Bedbugs. During this survey, the bug, *Cimex hemipterus* was found in the surveyed areas. The other areas recorded no bedbugs from the human dwellings visited. The prevalence of human dwelling with Bed bugs was 25% in Mushin and 20% in Ajeromi. Total numbers of bugs collected were 49. Bed bugs were recovered in the two areas, 23 (46.9%) from Ajeromi and

another 26 (53%) from Mushin. Intensities increased with prevalence in both areas. No significant differences (0.05%) existed in the prevalence of bedbugs in these two areas. The overall prevalence of Bedbug was 9%.

### Health education

After the survey, the health education imparted to the respondents was received with enthusiasm and immediate compliance. Some students were unaware of the lice infestation on them, while those that were aware had been using Kerosene, (Petroleum liquid product) but that was ineffective. Each infected Participant was given a bottle of Dettol, a comb and Dettol soap to prevent fur-

ther infestation.

The positive response and compliance were achieved by the actual observation of the bugs by the inhabitants that is mattresses with bedbugs were sprinkled with boiled water immediately put under the sun. Kerosene had been used by the people to try to control the bugs but was not so effective. Pifpaf (Bayer) an insecticide is the cheapest dust formulation which was applied to the mattresses and was very effective.

## DISCUSSION

According to Wiessman (2005), Lice and Bedbugs has always been an inevitable part of human existence and will always lurk out in the shadows when poverty, famine or war lets down their defenses. Matthew (1998) also stated that lousiness is associated with poverty, deprivation, intimate associations. This was also observed in the affected areas sampled in this study.

Head lice were more common than bedbugs in this study. Ejecie (1981) had reported Head lice as a common neglected health problem among school children in Lagos State, Nigeria. Students of the LASU Staff School were lice free probably because of better general sanitation and hygienic conditions as opposed to the rest of the schools surveyed. At LASU Staff School, parents were comparatively economically sound and that enabled them to offer good hair care as opposed to the other schools. Students at LASU regularly washed their hair with medicated soap hence improving their personal hygiene standards unlike in the other schools. Social amenities including properly treated water supply, well spaced sitting conditions was better in LASU as compared to the other schools. The hygienic conditions of the other schools visited were low compared to LASU Staff School. The health education component was passed on to the affected students. Good hygienic practices like avoiding sand on hair, social education; good grooming and hygiene have been reported to significantly reduce the prevalence of lice (Wikel, 1999; Ko and Elston, 2004).

Body lice and especially pubic lice were not collected in this study because of the reluctance of people to pull off their clothing. Heavy body louse infestations are found in people who live in unsanitary conditions as found in Mushin and Ajeromi areas of Lagos (Poudel and Barker, 2004). The other areas had head lice but the prevalence was low.

Bedbugs and Head lice were more abundant in Mushin and Ajeromi because the sanitary conditions and standards of living were relatively low compared to those of other areas surveyed. These areas were highly populated areas with clustered apartments of average of ten per family. The high population densities of developing countries with poor state of public utilities and sanitary habits among the inhabitants are highly conducive for bed bugs infestations. Even in the United States, Canada and United Kingdom today, bedbugs are found in rooming

houses and homeless shelters in urban areas, causing adverse effect on health and quality of life (Stephen et al., 2005). The same conditions have also been observed in Nepal, Asia by Poudel and Barker (2004). In this study, it was observed that bed bugs infested areas were marked with black and brown spots of excreta. They were found more frequently on children mattresses with urine smells.

Good housekeeping practices and filling up of cracks and crevices in homes will reduce infestations of Bed bugs (Parola and Raoult, 2001). Bedbugs can also be controlled by exposing mattresses under rays of sun, drying infested mattresses in addition to the use of aerosol, insecticide and propoxur dust (insect powder). Inhabitants were properly educated after the survey. The mere sight of these bed bugs was a positive factor to compliance to the health education intervention. Living in unpainted houses and excessively damp environment are also potential factors for infestation (Elsto and Stockwell, 2000; Anderson and Channey, 2009). Health education, good personal hygiene with adequate space within households will help eliminate these ectoparasites.

## ACKNOWLEDGEMENT

We thank the inhabitants of the five areas, their local government officials and Heads of the Schools visited, for assistance and cooperation during the study. Thanks are also due to Mr. Alagangan for field assistance.

## REFERENCES

- Altschuler DZ (2002). Zinsser, lice and history. Progress; the newsletter of the national pediculosis association. www. licesolution.com.
- Anderson RM (2004). Epidemiology. In Modern Parasitology. A textbook of Parasitology edited by FEG Cox. Second Edition pp. 50- 88.
- Anderson AL, Chaney E (2009). Pubic Lice (*Pthirus pubis*): History, Biology and Treatment vs. Knowledge and Beliefs of US College Students. Int. J. Entomol. Res. Public health (6)2: 592-600.
- Ejecie GC (1981). The parasitic diseases of Schoolchildren in Lagos State, Nigeria. Acta Trop. 38: 79-84.
- Elsto DM, Stockwell S (2000). What's eating you? Cutis 65: 262-264.
- Jelliffe DB, Stanfield JD (1978). Diseases of children in the subtropics and tropics. 3<sup>rd</sup> edition. Edward Publishing Ltd. London. UK. pp. 20-88.
- Ko CJ, Elston DM (2004). Pediculosis. J. Am. Acad. Dermatol. 50(1): 1-12.
- Kaaya GP, Samish M, Glazer I (2000). Emtomogenous fungi promising biopesticides for ticks' control. Exp. Appl. Acarol. 24(12): 913-26.
- Mathew BE (1998). Arthropods, Parasites. In: An Introduction to Parasitology pp. 47-48.
- Molyneux DH (1993). Vectors in Modern Parasitology, textbook of Parasitology edited by FEG Cox. Second Edition pp. 65-70.
- Orebanjo MA, Osokoya IO, Acholonu R, Ibrahim K (1990). Climatic conditions. In: Social studies book (2). (Ed) Macmillian pp. 1-14.
- Oyerinde JPO (1999) Anoplura (lice); Hemiptera (Bugs) In: Essentials of tropical medical Parasitology pp. 321-333.
- Parola P, Raoult D (2001). Molecular tools in the epidemiology of tick borne bacterial diseases. Ann. Biol. Clin. (Paris). 59(2): 1782.
- Pollack RJ (1997). Head lice description and biology. www.hsph.harvard.edu.
- Poudel SKS, Barker SC (2004). Infestation of people with lice in Kathmandu and Pokhara, Nepal. Med. Vet. Ent. 18(2): 212-213.
- Rechav Y, Nuttall PA (2000). The effects of male ticks on the feeding performance of immature stages of *Rhipicephalus sanquineus* and

- Amblyomma americanum* (Acari: Ixodidae). Exp. Appl. Acarol. 24: 569-578.
- Rozsa L (1997). Adaptive sex ratio manipulation in *Pediculus humanus capitus*: possible interpretation of the baxton's data. Parasitol. J. 83(3): 543-544.
- Sangwan AK, Sangwan N, Goel MC (2000). Progressive displacement of Hyalomma ticks by *Boophilus microplus* in India . J. Parasit. Dis. 24: 95-96.
- Stephen W, Hwang SJ, De Jong J, Kabasele KJ, Gogosis E (2005). Bed bug infestations in an urban environment. Emerg. inf. Dis. 11(4): 533-537.
- Wiessman G (2005). Rats, lice and Zinsser, Another dimension. Emerg. Inf. Dis. 11(3): 492-496.
- Wikel SK (1999). Modulation of the host immune system by ectoparasitic arthropods- blood feeding and tissue dwelling arthropods manipulate host defenses to their advantage. Biosci. 49: 311-320.
- Yoloye VL (1994). Phylum Arthropoda: Class Insecta. In: basic invertebrate Zoology pp. 257-272.