

Cockroach Infestation and Their Perceived Importance in Yenagoa Metropolis of Bayelsa State, Nigeria

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Abstract: This study aimed at cockroach infestations and their perceived importance in disease transmission was carried out in Yenagoa metropolis of Bayelsa State of Nigeria using sample survey method involving the retrieval of 225 descriptive questionnaires from the people bound on their knowledge of cockroach as vector of pathogenic organisms and the possible modes of control. On the frequency of cockroach infestation in habitats, respondents reported 20.40% cockroach infestation in private homes, schools (7.80%), offices (5.90%), hospitals (12.20%), toilets (18.40%), dust bins (15.70%) and restaurants (19.60%). 82.4% of the respondents affirmed that cockroaches are carriers of disease pathogens and are implicated as causative organisms of allergies and respiratory disease. About 23.5% were well aware that cockroach infestation triggers asthmatic attack in sensitive people. All the surveyed houses reported cockroach infestation, with high prevalence in the older houses (71.40%) compared to the recently built ones (53.90%). 78.4% of the respondents gave poor sanitary condition as an indicator for high cockroach prevalence. Concerning best method of control, 54.90% voted for the use of synthetic pesticides, biological control (23.53%) and cultural control (21.57%). Therefore, the teeming populace of Bayelsa State should be educated as to the perceived importance of the prevalence of cockroaches in homes, hospitals and food preparation centers especially as vectors of pathogenic organisms and be further sensitized on the best control practices such as good sanitation practice, food hygiene, stocking foodstuffs in sealed containers and proper disposal of refuse so as to reduce cockroach related menace.

Keywords: Yenagoa metropolis of Bayelsa.

1. INTRODUCTION

Cockroaches are important structural pests with public health and epidemiological implications. They are not only regarded as food spoilage insects but also as potential mechanical vectors of pathogenic organisms of human diseases such as poliomyelitis, bacteria, viruses, fungi, protozoa and helminthes (Tatfeng *et al.*, 2005, Getachew *et al.*, 2007, Fakoorziba *et al.*, 2010). They are associated with asthma and allergies (Kane *et al.*, 1999, Lwebuga-Mukassa *et al.*, 2002, Mindykowski *et al.*, 2010, Peden and Reed, 2010), psychological distress (Bell *et al.*, 2007), nosocomial infections and food poisoning (Pai *et al.*,

2004). According to Craczyk *et al.*, (2005), cockroaches carry pathogenic organisms that cause diseases like dysentery, typhoid, polio and gastroenteritis since they are omnivorous scavengers feeding on anything ranging from fermenting products, rotting food, faeces, fresh food and then move from one location to another with ease. Their filthy breeding habits, feeding mechanisms and indiscriminate travel between filth and food make them serious vectors of human enteric parasites. Cockroaches live in groups and are attracted to humidity, warmth and darkness hence predominant in toilets, bathrooms kitchens, dining and bedrooms. The presence of a cockroach should not be overlooked as

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they do multiply and spread very fast. This is because they secrete pheromone in their faeces which attract other cockroaches with resultant build up in unsanitary conditions. Kang and Chang (1985) and Kang *et al.*, (1987) reported that exposure to cockroach populations was a key player for atopic and allergic reactions in people living in cockroach infested environments. Thyseen *et al.*, (2004) and Chan *et al.*, (2004) pointed out that cockroaches are carriers of medically important organisms while Cruden and Markovetz, (1987) stated that their presence in households is of epidemiological importance owing to their nocturnal and filthy habits which make them ideal carriers of parasitic organisms.

This study assessed the prevalence of cockroaches in homes and their potentials in disease transmission in Yenagoa metropolis owing to the fact that they are synanthropic and live in close association with humans.

2. MATERIALS AND METHODS

2.1. Study Area

This study was carried out in Yenagoa the headquarters and capital city of Bayelsa State. Yenagoa, according to the last census of 2006 has a population of about 266, 008 individuals. Its geographical location is 4°55'29"N, 6°15'51"E/ 4.92472°N, 6.26417°E. The principal inhabitants of Yenagoa are the Ijaws, though a good number of other ethnic groups such as the Igbos, Hausas, Yorubas, Itsekiris, Urhobos also inhabit the community. The languages spoken are English and pidgin while Epie-Atissa is a major language spoken in the area. A sizeable number of its inhabitants are civil servants, some are farmers while others are widely traders. This study was carried out between July and October 2016 in Yenagoa where sanitary conditions are

below standard, with the absence of pipe borne water and total reliance of the populace on wells and commercial boreholes for water supply. The area was chosen because of the low sanitary condition, presence of refuse heaps which attracted flies and cockroaches, pit latrines in some homes and lack of adequate water supply even in home with water closet cistern.

2.2. METHODOLOGY

Adopting the procedure of Nodu, (2013), a total of three hundred (300) homes within Yenagoa were investigated by sample survey method employing the use of descriptive open ended questionnaires with optional questions bound on the people's knowledge of cockroach infestation, habitation, mode of feeding, perceived importance, ability for disease transmission and methods of control.

2.3. DATA ANALYSIS

The retrieve questionnaires were collated based on answers of respondents while results were expressed in percentages and charts plotted using Microsoft excel window 2010.

3. RESULTS

From the study, a total of 255 out of the 300 questionnaires distributed were retrieved from the respondents. On the frequency of cockroach infestation in habitats, fifty two (52) respondents reported 20.40% cockroach infestation in private homes, twenty (20) reported 7.80% infestation in schools, fifteen (15) reported 5.90% infestation in offices, thirty one (31) reported 12.20% infestation in hospitals, forty seven (47) reported 18.40% infestation in toilets, forty (40) reported 15.70% infestation in dust bins and fifty (50) reported for restaurants at 19.60% (fig. 1).

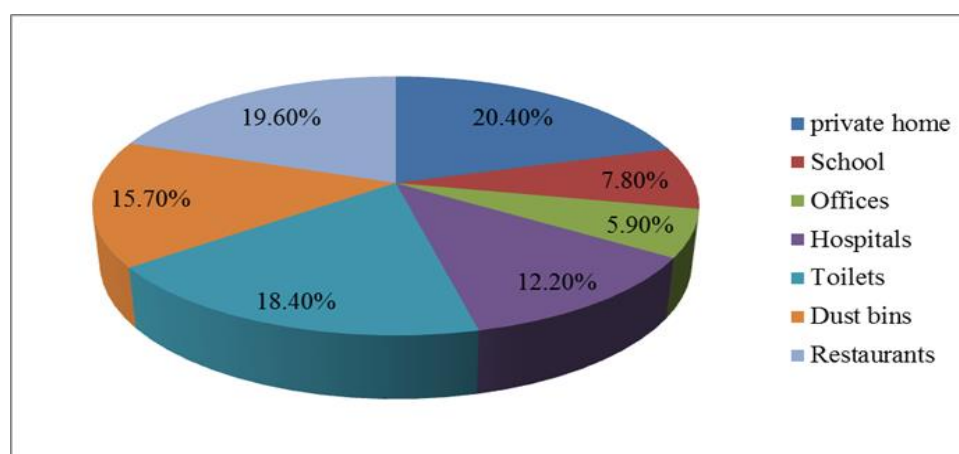


Fig. 1: Percentage distribution of cockroach infestation in Yenagoa metropolis

A total of two hundred and ten (210) respondents that is 82.4% affirmed that cockroaches are carriers of disease pathogens and are implicated as

causative organisms of allergies and diseases while forty five (45) respondents 17.6% disapproved of the saying (fig. 2).

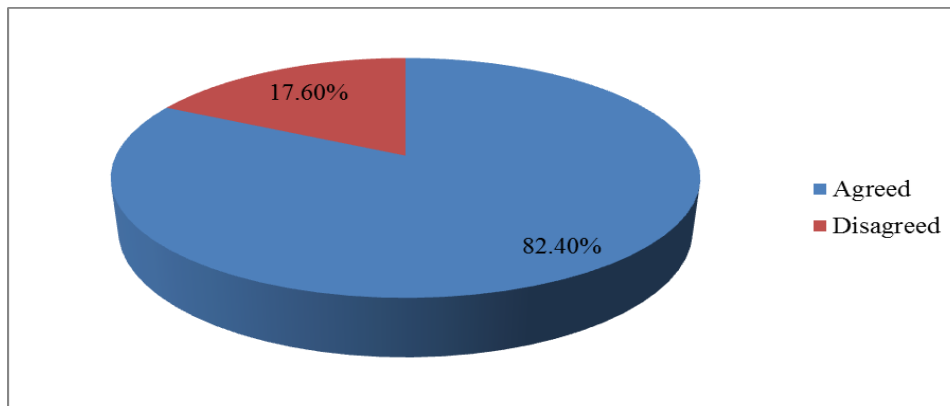


Fig. 2: Percentage distribution of respondents on cockroach as vector of disease pathogen

Also, sixty (60) respondents given 23.5% reportedly agreed to the statement that cockroach infestation triggers asthmatic attack in sufferers while

one hundred and ninety five (195) respondents 76.5% disproved the statement (fig. 3).

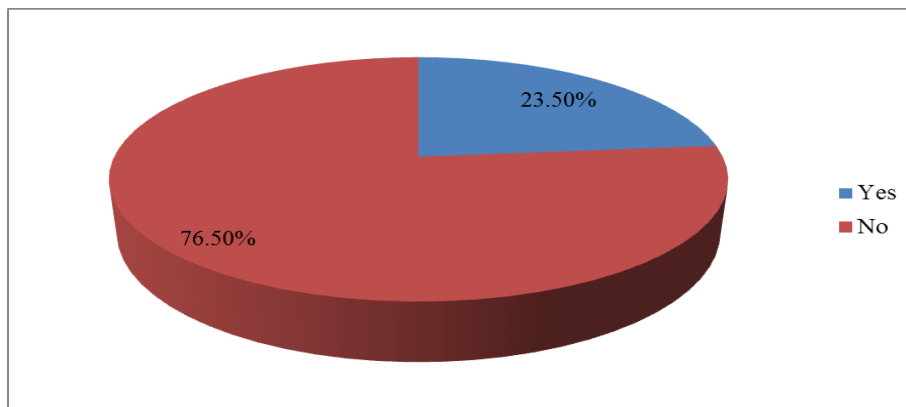


Fig. 3: Percentage distribution of respondents on cockroach infestation as triggers to asthma attack in sensitive persons.

Regarding poor sanitary condition as an indicator for high cockroach prevalence and recurrent infestation, a total of two hundred (200) respondents

that is 78.4% answered in the affirmative while fifty five (55) that is 21.6% negated the statement (fig. 4).

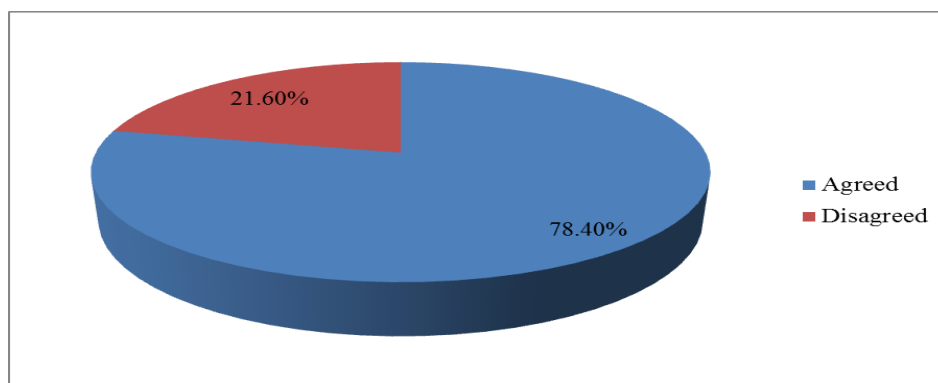


Fig. 4: Percentage distribution of respondents on poor sanitary condition as an indicator for high cockroach prevalence and infestation

With respect to age of building, a total of one hundred and forty houses were aged ten years and above while one hundred and fifteen houses were between one to ten years. All the surveyed houses in Yenagoa metropolis reported cockroach infestation (fig.

5), though the prevalence of cockroach infestation was higher in the older houses compared to the new one. The old houses (140) reported a total of 71.40% while the new houses (115) reported 53.90% cockroach infestation respectively.

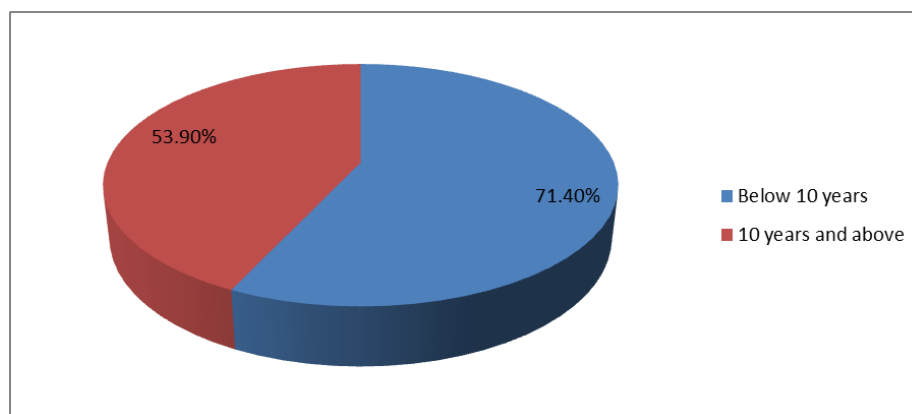


Fig. 5: Age of buildings occupied by respondents within Yenagoa metropolis

Concerning best method for cockroach control, one hundred and forty (140) respondents symbolizing 54.90% voted for the use of chemicals (synthetic pesticides), sixty (60) that is 23.53% stood

for biological control (plants and other natural enemies) while fifty five (55) respondents 21.57% affirmed the use of cultural control (good sanitary practices) as seen on fig. 5 below.

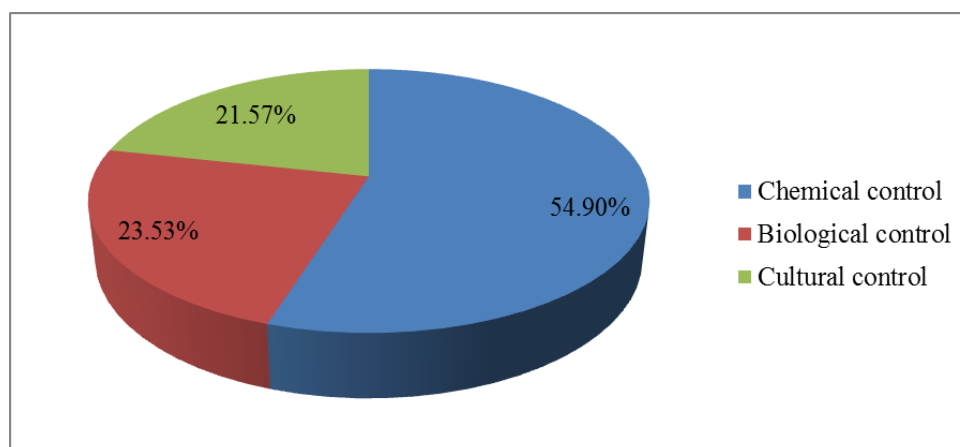


Fig. 6: Cockroach control methods

4. DISCUSSION

Cockroach and its perceived importance cannot be over emphasized. The presence and rising population of cockroaches in our homes, especially the kitchen, pose great problems in spite of so many pesticides been used continuously, though killing directly some of them, however causing side effects to humans (Rauh *et al.*, 2002). The ever presence of cockroaches in habitat such as dumps, cess pool, latrines, sewers and sewage treatment plants are of epidemiological significance. Cockroaches feed on human excreta as well as human food, thus are potential transmitters of diseases such as dysentery, typhoid, cholera and other food-borne infections which have been experimentally confirmed (Tatfeng *et al.*, 2005; Ghosh & Gayen, 2006; Bouamama *et al.*, 2007). According to Devi & Murray (1991) cockroaches are reservoirs of drug-resistant Salmonella bacteria while Pai, *et al.*, (2005) confirmed the isolation of bacteria with antibiotic resistance from household cockroaches.

habitats, respondents reported 20.40% cockroach infestation in private homes, 7.80% infestation in schools, 5.90% infestation in offices, 12.20% infestation in hospitals, 18.40% infestation in toilets, 15.70% infestation in dust bins and 19.60% in restaurants. The results obtained by the study indicate high level of cockroach infestation in homes, houses, restaurants, hospitals and even dust bins. This result is in conformity with those of Dong-Kyu, (1995), Mba and Kelly, (2003), Ghosh and Gayen, (2006), Omudu and Eyumah, (2008), Mpuchane *et al.*, (2008) who gave the reason for high cockroach infestation in homes and restaurants predominantly due to the presence of abundance of food materials, water and hiding place in crevices. Arlian *et al.*, (2002), Sarinho *et al.*, (2004) also reported that the high prevalence of cockroach in restaurants and hospitals has medical and epidemiological significance since these places could become centres for disease outbreak stating that patients in hospitals are at greater risk of having cockroach related respiratory allergies due to their low immunity level.

On the frequency of cockroach infestation in

82.4% of the respondents affirmed that cockroaches are carriers of disease pathogens and are implicated as causative organisms of allergies and diseases. This is in conformity with the reports of Alcamo & Freshman, (1980), Morelli, (1981), Brener & Patterson, (1987) who stated that cockroaches have been scientifically implicated as vectors of pathogenic bacteria which they convey unto food preparation areas and unto food hence responsible for food poisoning outbreaks. This is also in agreement with the statement of Rauh *et al.*, (2002); Sarinho *et al.*, (2004) that not only do cockroaches present variety of health hazard when found in our homes, but are also a threat in commercial places, spreading diseases through any food source hence cause food poisoning as they come in contact with food materials. Furthermore about twenty two species of bacteria (enteropathogenic bacteria), viruses (poliomyelitis virus), fungi (*Aspergillus* species), protozoa (amoeba cyst) and five species of worms (eggs of worms) have been reportedly isolated from the body of the American cockroach *P. americana* (Soedarto, (1995); Kesetyaningsih, (2012) which are confirmed as vectors of these pathogenic organisms. Cockroaches harbour pathogenic organisms that cause poliomyelitis and are carriers of organisms causing diarrhea, dysentery, cholera, leprosy, plague, typhoid and other viral diseases (WHO, 2005; WHO, 2011; Pai *et al.*, 2004; Meyer, 2015; Jeff, 2015). At least 22 species of pathogenic human bacteria, viruses, fungi and protozoans as well as five species of helminthic worms have been isolated from cockroaches (Rust *et al.*, 1991), Baumholtz *et al.*, (1997), Fathpour *et al.*, (2003), Tattfeng *et al.*, (2005), Saichua *et al.*, (2008). The bacterium *Pseudomonas aeruginosa* multiplies extensively in the gut of cockroach causes several diseases like urinary tract infections, digestive problems and sepsis (Shraddha, 2014).

About 23.5% reportedly agreed to the statement that cockroach infestation triggers asthmatic attack in sensitive people which is agreement with several authors such as Silva *et al.*, (2005); Rosenstreuch *et al.*, (1997); Rauh *et al.*, (2002); Sarinho *et al.*, (2004) who stated that dust containing cockroach excreta triggers allergic reaction such as wheezing in many individuals, making it particularly harmful to asthmatic patients. They further reported the establishment of a robust association between the presence of cockroaches and increase in the severity of asthma symptoms in individuals sensitive to cockroach allergen. While a total of one hundred and ninety five (195) respondents 76.5% are ignorant of this truth. Adeyemi (2010); Wink, (1993); Crinnion, (2009); Rumbeiha, (2012) also stated that in trying to control cockroach infestation in homes, people use more of synthetic pesticides which is also a health risk factor because this could trigger allergies, asthma and other respiratory infections in people that are highly sensitive. This point is further buttressed by Kang & Chang,

(1985), Kang *et al.*, (1987) who observed that cockroach poses other risk to human health like the ability of cockroach skin, exudance and exuviae to mix with dust particles in homes thereby causing allergic reactions and even asthmatic attack in sufferers. Rauh *et al.*, (2002) and Barbara, (2008) also pointed out that cockroach allergen exposure was associated with asthma and allergy, especially in lower social-economic groups where houses are in poorer state of repairs. In addition cockroaches carry the eggs of parasitic worms that cause allergic reactions, including dermatitis, itching, swelling of the eyelids and more serious respiratory condition (Stankus *et al.*, 1990).

With respect to age of building, a total of one hundred and forty houses were aged ten years and above while one hundred and fifteen houses were between one to ten years. All the surveyed houses in Yenagoa metropolis reported cockroach infestation, though the prevalence of cockroach infestation was higher in the older houses compared to the new one. The old houses reported a total of 71.40% while the new houses reported 53.90% cockroach infestation respectively. This is supportive of the result of Wang *et al.*, (2008) who stated that the age of a building also has a whole lot to do with cockroach infestation. They reported that buildings that are above ten years old tend to be associated with more infestation than recent buildings, reason been the many damages like leaking roof, broken walls, crevices, broken pipes (especially in toilet areas and kitchen) and also the nature of the building whether painted, unpainted or not even plastered. This result also aligns with that of Gholam *et al.*, (2013) who discovered that cockroach infestation is higher in buildings that are dilapidated and are within the range of ten years old and above.

Regarding poor sanitary condition as an indicator for high cockroach prevalence and recurrent infestation, 78.4% of respondents answered in the affirmative while 21.6% negated the statement. This is in agreement with the report of Bell *et al.*, (2007) that cockroaches are omnivorous scavengers feeding on dead animal, plant matter and as they live in kitchen, they feed on food scraps and other food products especially food rich in carbohydrates such as papers, starchy materials and others hence advocating the importance of cleaning up and hygiene as a form of cockroach infestation prevention and control in homes. Rauh *et al.*, (2002) also reported that deteriorated honey contributes to high cockroach allergen levels in inner-city households.

Concerning best method for cockroach control, 54.90% respondents voted for the use of chemicals (synthetic pesticides), 23.53% stood for biological control (plants, natural enemies and biopesticides) while 21.57% affirmed the use of cultural control (good sanitary practices and food hygiene). This result also confirms the report of Jitendra *et al.*, (2009) about the

deployment of different methods of control by the ancient man such as prayers, magic spells, cultivation systems, mechanical practices as well as application of organic and inorganic substances (including pesticides). However, according to Senthil & Kalaivani, (2005) the best pest control method is that which is non-toxic and environment friendly, economical and easily available hence the use of natural plant parts/products as bio-pesticides (biological control) to overcome the problems of synthetic chemical hazards, which has become popular due to their degradability, least persistence and least toxicity to non- target organisms.

According to Brenner, (1995), the odorous, oily and filthy secretion cockroaches exude alters the flavour of food which could lead to psychological distress and food poisoning when such food is eaten. Cockroaches also do pick up disease causing organisms like Salmonella species on their legs and deposit them later on food causing food poisoning as they move on and around the food Goddard (2003). According to Brenner, (1995), Roth and Willis, (1957), Cornwell, (1976), Cornwell and Mendes (1981), Oothuman *et al.*, (1989), pathogenic bacteria species are associated with cockroaches and these include Bacillus species, Clostridium species, Enterobacter species, *Eschericia coli*, Salmonella species, *Proteus vulgaris* and *Staphylococcus aureus*.

CONCLUSION

Cockroaches live longer without food than without water, therefore potential sources such as dropping faucet and leaks as well as food sources should be reduced. Food and kitchen hygiene should be encouraged in homes where dirty dishes are kept in containers with tight fitting lids and should be reduced by emptying outside frequently. Used plates should be submerged in soapy water until they are washed. The kitchen should be cleaned especially in areas where grease tends to accumulate. Small cracks and crevices should be sealed with paint or cement to reduce the number of cockroaches. Finally people should avoid creating cluster of old newspapers because it is an ideal habitat for cockroaches.

RECOMMENDATION

The populace in Yenagoa metropolis in Bayelsa States should be sensitized as to the implication of the prevalence of cockroaches in homes, hospitals and food preparation centers especially since cockroaches are vectors of disease pathogenic organisms of food borne infections, causative organism that triggers allergies and asthmatic attacks in patients and further educate them on the best control practices such as good sanitation practice, personal cleanliness in food preparation areas, safe keeping of foodstuffs in sealed containers and proper disposal of refuse so as to reduce the spread of infectious diseases. Also they should be introduced to the practice of using plant extracts and products (bio-pesticides) such as Neem

leaves which can be ground and dilute with water forming paste, with the extract filtered and sprayed around corners of houses especially damp places and also used to seal up the point of entry of cockroaches into the house.

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