



The Infestation of Cockroach and Their Perceived Importance in Yalanguruza and Nassarawo Communities, Gombe, Nigeria

Ezra Abba^{1*}, Abubakar Jibrin Ibrahim², Kennedy Poloma Yoriyo¹
and Blessing Chinwendu Emmanuel²

¹Department of Zoology, Faculty of Science, Gombe State University, Gombe, Nigeria.

²Department of Biological Science, Faculty of Science, Gombe State University, Gombe, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Authors EA and AJI designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors KPY and BCE managed the analyses of the study and the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJOB/2020/v10i230104

Editor(s):

(1) Dr. Mai Sabry Saleh, National Research Centre, Egypt.

Reviewers:

(1) Abesh Chakraborty, Maulana Abul Kalam Azad University of Technology, India.

(2) Jeverson Santiago Quishpe Gaibor, Salesian Polytechnic University, Ecuador.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/61100>

Original Research Article

Received 20 July 2020
Accepted 25 September 2020
Published 29 September 2020

ABSTRACT

Aims: Poor sanitation is strongly associated with an increased cockroach infestation. In line with this, the study was carried out to ascertain and quantify the level of cockroach infestation and their perceived importance in Yalanguruza and Nassarawo communities.

Study Design: Each community was sectioned into four longitudinal zones and 50 houses were randomly selected from each zone for the collection of samples and administration of questionnaires.

Place and Duration of Study: This study was carried out between May and August 2018. Samples were collected in Yalanguruza and Nassarawo communities of Gombe and identified in the Department of Biological Sciences, Gombe State University.

Methodology: A total of 409 cockroaches were collected from different sources in residential homes, 208 in Yalanguruza and 201 in Nassarawo using Hercules mouse glue board with pieces of Cray-fish as baits and were preserved and identified to their respective species. Structured

*Corresponding author: E-mail: ezra.abba@gmail.com;

questionnaires were used to obtain the perception of the respondents in the communities about cockroaches. A total of 200 questionnaires were administered in each of the communities.

Results: Up to 78% of the respondents had low knowledge of cockroach infestation and 66% attributed infestation to poor sanitation. The most-reported perception of cockroaches habitation in homes was toilets (66.5%) while the majority (57%) of the respondents knew that cockroaches can be vectors of diseases. 68.5% of the respondents used insecticides in controlling cockroaches. Food items compared to other items showed to be the most commonly affected by the cockroaches with 48% of the respondent attesting that. Cockroach species identified from the two communities were *Periplaneta americana* with the highest frequency value of 196(47.9%), *Blattella germanica* 94(23.0%), *Supella longipalpa* 67(16.4%), *Blatta orientalis* 38(9.3%) and *Arinevaga floredensis* 14(3.4%). The highest numbers of cockroaches were obtained from Yalanguruza, 208(50.9). Out of the 409 cockroaches collected, 314(76.8%) were from toilets, 30(7.35%) from bedrooms and 65(15.80%) from kitchens.

Conclusion: High infestation of cockroaches in the study communities was observed and there are poor knowledge and perception of cockroaches in the communities; hence there is a need to sensitize the people in the communities on the potential public health impact of cockroaches.

Keywords: Cockroach; perception; infestation; Yalanguruza; Nassarawo; Gombe.

1. INTRODUCTION

Cockroaches are household pests and range in size from ¼(0.64 cm) to 3(7.62 cm) [1]. Over 3500 species have been identified, 30 of these species are more adapted to human habitation, of these, *Blattella germanica* (German cockroach), *Periplaneta americana* (American cockroach), and *Blatta orientalis* (Oriental cockroach) are considered the most common pest to humans [1-3]. They appear to be the most abundant and obnoxious non-biting insect pests in residential buildings, hospitals, hotels, and restaurants [4]. They are reported to move freely from building to building or from drains, gardens, sewers, and latrines to human habitations. Cockroaches are capable of transmitting many pathogens including bacteria, viruses, fungi, protozoa and pathogenic helminths that threaten human health [5,6]. Cockroaches carry bacteria and are responsible for gastroenteritis, dysentery, and typhoid [7]. This is probably because cockroaches frequently feed on human faeces [8]. Some of the diseases caused by these pathogenic helminths and protozoans are amoebiasis, Giardiasis, Ascariasis may also be responsible for chronic diarrhoea, liver failure, intestinal disturbances and stunted growth in the affected individuals [9,10]. They also give out an unpleasant odour, giving many people allergies as significant risks are indoor public health risks [11]. The perceptions and attitudes of those who suffer cockroach infestation are important in determining the tolerance and injury levels. This will guide the best and effective cockroach control strategy [12]. Therefore, this study is aimed at assessing

the rate of cockroach infestation and evaluating the people's perception of cockroaches.

2. MATERIALS AND METHODS

2.1 Description of the Study Area

The study was conducted in two communities; Yalanguruza(Y/Guruza) and Nassarawo Area of Gombe local Government of Gombe state between May and August 2018. Gombe town lies on 10°16'60.00" N 11°09'60.00" E. It experiences two seasons, the wet season (April to October) and dry season (November to March) and their average daily temperatures are 34°C in April and 27°C in August. The relative humidity ranges between 70-80% in August and drops between 15-20% in December. The natural vegetation of Gombe is typically that of the Sudan savannah and is composed of shrubs, herbs grasses, and sparsely distributed trees. These provide enough free-range land for ruminant animals rearing.

2.2 Selection of Residence

Fifty households were randomly selected from each of the four longitudinal zones in each of the two communities. In each of the selected communities, the elderly persons were identified to provide information about attitude and practices towards cockroach perception and infestation. To solicit occupants' cooperation and participation throughout the study, advocacy visits were made to each of the selected houses. The questionnaire was designed and personally administered to these residents. Local dialect (Hausa) was used to inquire about information

from the elderly ones and those who could not read. The questions investigated activities of cockroaches in the rooms, methods of control employed by residents, and their view on the level of satisfaction for the control methods employed.

2.3 Materials

Hercules mouse glue board, Pieces of crayfish or smoked fish, Quantitative Questionnaire.

2.4 Sample Collection, Identification and Preservation

Cockroaches were trapped using a Hercules mouse glue board, measuring 30 cm in length and 20 cm in width. After a thorough visual inspection of the room, kitchen, and toilet to identify cockroaches, the glue board was placed on the path. Pieces of crayfish or smoked fish were placed in the middle of the board as bait. The glue board was left over-night, trapped cockroaches were collected in the morning, and taken to the Zoology laboratory of Gombe State University, Gombe state Nigeria for preservation and identification. The cockroaches were identified using identification keys in [13].

2.5 Data Analysis

Data were analyzed using percentages and frequencies shown in tables.

3. RESULTS AND DISCUSSION

3.1 Results

The level of cockroach infestation in homes base on the perception of respondents living in the study areas was divided into high and low and are represented in percentage as shown in Table 1. From Table 1; it can be strongly inferred that both communities have a low rate of the cockroach infestation.

Various reasons for cockroach infestation were also gathered from the respondents. The result is shown in Table 2 with respondents not knowing why they are having cockroach infestation as the lowest frequency.

The respondent perceptions on where cockroaches can be found in homes are shown in Table 3. A high percentage of the respondent from both communities perceived that most cockroaches are found in the toilets while the least majority of cockroaches are found in bedrooms.

Out of the 200 respondents each from both communities, only a little percentage perceived cockroaches as harmless. The perceptions of the knowledge of cockroaches from the two communities are shown in Table 4.

Various control measures on cockroach infestation have been used in the two communities, the percentage of the different measures used are shown in Table 5. From the table, most of the respondents apply pesticides as a control measure against cockroaches, with more percentage from respondents in Nassarawo (67%).

Table 6 showed the result of items damaged by cockroaches. Out of the items affected, food items appears to be the highest affected items showing a 45% and 51%, followed by books with 30% and 21%, bags; 10% and 8%, shoes; 7% and 10%, textile; 6% and 5%, and finally mattress with 2% and 5% in Y/Guruza and Nassarawo respectively.

A total of 409 adult cockroaches were collected from households randomly selected during the period of the survey. Five species of cockroaches namely, *Periplaneta americana*, *Blattella germanica*, *Blatta orientalis*, *Arenavaga floredensis* and *S. longipalpa* were identified. The result in Table 7, showed *P. americana* to be the most commonly captured species from both communities.

Results showing evidence of places where cockroaches were found are shown in Table 8. Cockroaches captured in the toilets have the highest frequency of 74.1% and 70.8% in Y/Guruza and Nassarawo communities respectively.

Table 1. Perceived level of cockroach infestation in homes in Y/guruza and Nassarawo communities

Respondent	Y/GURUZA		NASSARAWO	
	Frequency n(=200)	Percentage (%)	Frequency n(=200)	Percentage (%)
High	46	23	42	21
Low	154	77	158	79
Total	200	100	200	100

Table 2. Perceived reason for cockroach infestation in Y/guruza and Nassarawo communities

Respondent	Y/GURUZA		NASSARAWO	
	Frequency n(=200)	Percentage (%)	Frequency n(200)	Percentage (%)
Poor sanitation	130	65	134	67
Lack of pesticide	60	30	58	29
Don't know	10	5	8	4
Total	200	100	200	100

Table 3. Perceived cockroach habitation in homes Y/guruza and Nassarawo communities

Respondent	Y/GURUZA		NASSARAWO	
	Frequency n(=200)	Percentage (%)	Frequency n(=200)	Percentage (%)
Bedroom	12	6	6	3
Kitchen	16	8	14	7
Toilet	132	66	134	67
All of the above	40	20	46	23
Total	200	100	200	100

Table 4. Perceived knowledge of the role of cockroaches by the communities

Respondents	Y/GURUZA		NASSARAWO	
	Frequency n(=200)	Percentage (%)	Frequency n(=200)	Percentage (%)
Inept	44	22	76	38
Vector of disease	126	63	104	52
Irritating	120	10	16	8
Harmless	10	5	4	2
Total	200	100	200	100

Table 5. Cockroach control measures employed in Y/guruza and Nassarawo communities

Respondent	Y/GURUZA		NASSARAWO	
	Frequency n(=200)	Percentage (%)	Frequency n(=200)	Percentage (%)
Insecticides	140	70	134	67
Physical killing	34	17	36	18
Use of adhesive gum	6	3	10	5
Proper food storage	8	4	6	3
Never did anything	12	6	14	7
Total	200	100	200	100

Table 6. Type of items affected by cockroaches Y/guruza and Nassarawo communities

Respondent	Y/GURUZA		NASSARAWO	
	Frequency n(=200)	Percentage (%)	Frequency n(=200)	Percentage (%)
Food items	90	45	102	51
Books	60	30	42	21
Bags	20	10	16	8
Textile	12	6	10	5
Shoes	14	7	20	10
Mattress	4	2	10	5
Total	200	100	200	100

Table 7. Distribution of cockroaches captured in Y/Guruza and Nassarawo communities

Species	Y/GURUZA		NASSARAWO	
	Frequency	Percentage (%)	Frequency	Percentage (%)
<i>P. americana</i>	94	45.2	102	50.7
<i>B. germanica</i>	46	22.2	48	23.9
<i>S. longipalpa</i>	48	23.1	19	9.5
<i>A. floredensis</i>	6	2.9	8	4
<i>B. orientalis</i>	14	6.7	24	11.9
Total	208	100	201	100

Table 8. Places where cockroaches were captured in Y/guruza and Nassarawo communities

Sites	Y/GURUZA		NASSARAWO	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Toilets	154	74	160	79.6
Bedrooms	14	6.7	16	8
Kitchens	40	19.2	25	12.4
Total	208	100	201	100

3.2 Discussion

A total of 409 cockroaches were collected for this study; 208 (50.86%) from Y/Guruza and 201 (49.14%) from Nassarawo. The infestation rates of cockroaches in both communities were said to be low with a lower percentage in Nassarawo (21%) against the 23% in Y/Guruza; according to the respondents' perspective. The result given by the respondents may be as a result of not wanting to be associated with a cockroach infestation. This research is an original investigation conducted in the study area.

Most of the respondents related cockroach infestation with poor sanitation followed by lack of pesticide application while the least percentage does not seem to know the reason for cockroach infestation and are aware of the parasites vectored by these cockroaches but the use of insecticides on these cockroaches was high from both communities. The health implications of cockroach infestation are aggravated by the increasing use of insecticide for control. Even though the standard approach for controlling cockroaches is to use pesticides [14]. The continuous indiscriminate use of pesticides may result in the environmental pollution in the various homes and could lead to accidental contamination of foods as food is the highest affected item by the cockroaches. Similar findings were reported by Omudu and Akosu [15] on the infestation of rodents and cockroaches in Benue State university student hostels.

In the present study, most cockroaches were caught in the toilets, followed by those caught in

kitchens and the bedroom. The abundance of cockroaches in the study area could be mainly due to their cosmopolitan distribution and ability to reproduce and to survive more easily in the tropical climate region. This agrees with similar studies [16], although, in Owerri [17], Hawaii [18], and Jos [19], Nigeria different studies revealed that just two species of cockroaches (*P. americana* and *B. germanica*) were distributed in human habitations in their localities.

4. CONCLUSION

The study revealed that the level of cockroach infestation is high in Nassarawo compared to Yalanguruza with the higher abundance of *P. americana* and *B. germanica* which were mostly found in toilets. This is largely due to poor sanitation. There is a need for intense advocacy to communities for enlightenment on the proper prevention and control measures of cockroaches to minimize the chances of transmitting diseases vectored by cockroaches.

CONSENT

Consent from the local community as well as the individual households visited for sample collection and administration was sought before the commencement of the work.

ACKNOWLEDGEMENTS

The authors wish to express their sincere thanks to the residents of Y/Guruza and Nassarawo for their understanding and support to conduct this research.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- Baumholtz M, Parish LC, Witkowsk J, Nutting W. The medical importance of cockroaches. *International Journal of Dermatology*. 1997;36(2):90-96.
DOI: 10.1046/j.1365-4362.1997.00077.x
- Gullan PJ, Cranston PS. An outline of entomology. Illustrations by K. Hansen McInnes. Blackwell Publishing Ltd. Hardback. 2005;505.
- Salehzadeh A, Tavacol P, Majhub H. Bacteria, fungi and parasitic contaminants of cockroaches in public hospitals of Hamedah. *Iranian Journal of Vector-Borne Diseases*. 2007;44:105-110.
- Piper GL, Antonelli AL. Cockroaches: Identification, biology and control. Agricultural Research Centre, Washington State University; 2012.
Available: <https://www.pnw0186.html>
- Tawatsin A, Thavara U, Chompoosri J, Kong-ngamsuk W, Chansang C, Paosriwong S. Cockroach surveys in 14 provinces of Thailand. *Journal of Vector Ecology*. 2001;26:232-238.
PMID: 11813661
- Pai HH, Chen WC, Peng CF. Cockroaches as potential vectors of nosocomial infestations. *Infection Control and Hospital Epidemiology*. 2004;11:979-984.
DOI: 10.1086/502330
- Rivault C, Cloarec A. Outcomes of insecticides control of cockroaches (Dictyoptera: Blattellidae) in public housing in France. *Journal of Environmental Management*. 1997;51:187-197.
DOI: 10.1006/jema.1997.0142
- Hamu H, Debalke S, Zemene E, Birlie B, Mekonnen Z, Yewhalaw D. Isolation of intestinal parasites of public importance from cockroaches (*Blattella germanica*) in Jimma town, Southwestern Ethiopia. *Journal of Parasitology Research*. 2014;1:1-5.
DOI: 10.1155/2014/186240
- Montessor A, Crompton DW, Gyorkos TW, Savioli L. Helminth control in school-aged children. A guide for managers of control programmes. World Health Organisation, Geneva. 2002;64.
- Adeleke MA, Oyebamiji AA, Hassan AO, Wahab AA, Olaitan JO. Biolarvicidal efficacies of entomopathogenic microorganisms isolated from the breeding sites of mosquitoes in Osogbo, Southwestern Nigeria. *African Entomology*. 2012;20(2):290-294.
- Brenner RJ, Rust MK, Owens JM, Reiersen DA. Understanding and controlling the German cockroach. Oxford University Press. New York. 1995;1-19.
- Majekodunmi A, Howard MT, Shah V. The perceived importance of *Blatta orientalis* and *Blattella germanica* infestation to social housing residents. *Journal of Environmental Health Research*. 2002;1(2):27-34.
- Runstrum ES, Bennet GW. Distribution and movement pattern of German cockroaches within apartment building. *Journal of Medical Entomology*. 1990;27(4):515-518.
DOI: 10.1093/jmedent/27.4.515
- Koehler PG, Patterson RS, Owens JM. The chemical systems approach to German cockroach control. Oxford University Press, New York, New York. 1995;287-323.
- Omudu E, Akosu G. Cockroach and rodents infestation in Benue State University Students hostel in Makurdi and their epidemiological implications. *Journal of Parasitological and Vector Biology*. 2013;5(5):60-65.
- Atiokeng TRJ, Tsila GH, Wabo PJ. Medically important parasites carried by cockroaches in Melong Subdivision, Littoral, Cameroon. *Journal of Parasitology Research*. 2017;1-8.
DOI: 10.1155/2017/7967325
- Ajero CMU, Ukaga CN, Ebirim C. The role of cockroaches (*Blatta orientalis* and *Periplaneta americana*) in mechanical transmission of parasites in households in Owerri, South East Nigeria. *Nigerian Journal of Parasitology*. 2011;32(2):153-156.
- Chan OTM, Lee EKW, Hardman JM, Navin JJ. The cockroach as a host for *Trichinella* and *Enterobius vermicularis*: Implications for public health. *Hawaii Medical Journal*. 2004;63(3):74-77.
PMID: 15124739

19. Ejimadu LC, Goselle ON, Ahmadu YM, James-Rugu NN. Specialization of *Periplaneta americana* (American cockroach) and *Blattella germanica* (German cockroach) towards intestinal parasites: A public health concern. Journal of Pharmacy and Biological Sciences. 2015;6:23–32.

© 2020 Abba et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/61100>