



Preventive and Remedial Measures to House Termite Infestations in Two Ikwerre Communities of Rivers State, Port Harcourt, Nigeria

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ABSTRACT: From forests to human dwellings, infestations of woods by termites are on the increase. Despite the increasing occurrences of termite infestations in human dwellings in the Niger Delta region, there is still insufficient information about the preventive and remedial measures towards house termites by house-owners (HOs) in the region. Through a survey of Omuoko [n = (50%) = 82] and Omuihechi [n = (50%) = 57] communities in the Ikwerre area of Port Harcourt, this study analyzed a 139-house owner samples using standard methods. Data obtained show that 64.7% of HOs use preventive measures which include chemicals (43.2%), chemicals and non-wood materials (20.9%), and non-wood materials (0.6%). A sub-total of 73 HOs representing 52.5% of the total respondents use remedial measures with chemicals (34.2%) being dominant, followed by Chemicals and replacement (27.4%), Replacement (17.8%), Scraping (12.3%), Chemical and scrapping (6.8%), and cement (1.4%). This study indicates that old, wooden, and thatched houses are highly susceptible to termites' infestations, thus deserving periodic preventive and remedial treatments through expert consultations and/or do-it-yourself methods.

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Termites as social insect exhibit high fecundity rate (Wako, 2015), thus its infestations on any substrate including trees and its wood products are frequently massive. Termites are one of the most important wood-destroying insects in homes and their infestations are a worldwide problem where nearly every household around the globe live within the risk sensitive area of the insect (Buczowski and Bertelsmeier, 2017). The most sensitively risky areas for termites' infestations are tropical and subtropical environments (Ghaly and Edwards, 2011) due to their diversity causing concomitant significant damage to wooden components of homes (Verma *et al.*, 2009; Kuswanto *et al.*, 2015). Recently, global termites attack in structural materials have been estimated to worth billions of dollars and property owners spend over two billion dollars to treat them per annum (EPA,

2017). Many studies have documented the preventive and remedial measures to control building termites across the globe, however little is known about the knowledge of house-owners towards house termites control in Nigeria. This study therefore was carried out to fill this gap and widen the current research base by investigating Nigerians house owners' preventive and remedial practices towards their house termite infestations in Southern region.

MATERIALS AND METHODS

Study sites: The study sites comprise of 2 adjoining communities (Omuoko and Omuihechi) in the Ikwerre area, Port Harcourt, Rivers State, Nigeria. The communities are around 3 miles to the University of Port Harcourt administrative office. The Omuoko community lies within longitudes 4° 55' 11.6" N and

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4° 55' 08.5" N, and latitudes 6° 54' 29.5" E and 6° 54' 23.8" E. Omuihuechi on the other hand, lies between longitudes 4° 55' 12.7" and 4° 55' 12.6" N, and latitudes 6° 53' 48.8" E and 6°53' 48.7"E. These sites share common boundary and climatic conditions; the equatorial zone with a rainfall pattern typical of the moist swamp forest zone of Nigeria. The communities (Omuoko and Omuihuechi) are typically peri-urban settlements with estimates of about 268 and 182 residential houses, of which 164 and 114 house owners respectively live therein. The residents are mostly traders and majority of the houses are blocks made. The population is mainly of the Ikwerre-speaking ethnic group of Niger Delta.

Data collection: Prior to data collection, 20 copies of questionnaire were pretested and consents of respondents were sought during reconnaissance survey about the purpose of the study. One hundred and thirty nine (139) respondents (82; Omuoko and 57; Omuihechi) representing 50% of the house owners living in their houses were randomly sampled and used in this study. Then, actual survey was performed with the aid of pretested questionnaire to document the preventive and remedial measures employed in the control of home termites in the 2 selected communities.

Statistical analyses: Data were coded and processed using IBM SPSS Statistics 21. Frequency tables were used to present the results and Chi-square tests were performed to establish association between some parameters at α 0.05.

RESULTS AND DISCUSSION

Characteristics of the house owners and their houses: Demographic results are presented in Tables 1 and 2. The findings of this study suggest that native people are the major house owners, reflecting a characteristic of low ethnic co-inhabitation. Like many African countries, land still remains a traditional resource/asset of local people in Nigeria. Thus, there still exist unceasing conflicts in some zones between the buyers and sons-of-the-soil during transfer, development and even after the development of the purchased land (Boone, 2017). Long history of non-native sufferings and abuse from sons-of-the-soil may be attributed to the very low numbers of non-native house owners in the 2 studied communities. The gender gap of house ownership found in this study confirms the cultural household's headship responsibility by men in typical Nigerian settlement settings. Even when some women built, some husbands still arrogate such houses to themselves.

Table 1: Demographics of house owners

Parameters	Response	Frequency	Percentage (%)
Ethnicity	Ikwerre	129	92.8
	Ibo	4	2.9
	Isoko	2	1.4
	Efik	2	1.4
	Abonema	1	0.7
	Hausa	1	0.7
	Total	139	100
Gender	Male	118	84.9
	Female	21	15.1
	Total	139	100
Age (Years)	20-30	3	2.2
	31-40	67	48.2
	41-50	44	31.7
	51 and above	25	18.0
	Total	139	100
Marital Status	Single	8	5.8
	Married	124	89.2
	Widowed	7	5.0
	Total	139	100
Highest Educational Qualification	Non formal	10	7.3
	Secondary	90	64.7
	School		
	HND/OND	2	1.4
	BSc	34	24.5
	MSc	2	1.4
	PhD	1	0.7
	Total	139	100
Employment Status	Employed	47	33.8
	Self-	75	54.0
	Employed		
	Retired	17	12.2
	Total	139	100

The result of the gender gap found in this study is in line with the findings of Edet and Etim (2014) and Adebisi *et al.* (2018). The age group 31-40 years accounted for the highest numbers of house owners followed by the age group 41-50. These active groups of people constituted approximately 80% of the total respondents thus suggest high promptness attention to termite problems. This result however, is not in agreement with findings of Ugbomeh and Diboyesuku (2019). Large numbers of married respondents found in this study suggest high responsibility to secure houses from termites. The holders of Secondary

School Certificates dominance among the house owners found in this study is not in agreement with findings of Adegoke *et al.* (2016) that the higher the education, the greater the ability to build a house. The local policy of closeness to higher institutions and other centres of attractions by the 2 studied communities might have had an impact in the employment pattern of the house owners. In all, the characteristic analysis of house owners has shown a high level of strengths, which may be helpful to control termites in their households.

Table 2: Characteristics of houses

Parameters	Response	Frequency	Percentage (%)
Type of House	Block	131	94.2
	Wooden	7	5.0
	Thatched	1	0.7
	Total	139	100
Age of House	1-5	11	7.9
	6-10	36	25.9
	11-15	40	28.8
	16-20	20	14.4
	21 and above	32	23.0
	Total	139	100
House Arrangement	Storeyed	4	2.9
	Bungalow	132	95.0
	Duplex	3	2.2
	Total	139	100
Landscaping	Bare earth	134	96.4
	Concrete	5	3.6
	Total	139	100
Floor type	Tiles	77	55.4
	Concrete	59	42.4
	Wood	3	2.2
	Total	139	100
Occupancy	With family and tenants	76	54.7
	Alone with family	56	40.3
	Alone with tenants	5	3.6
	Alone	2	1.4
	Total	139	100

Knowledge level of house-owners about termites' proliferations and preventive measures: Results of the knowledge of house owners regarding termite proliferation in the areas before they built their houses are presented in Table 3. As observed, termite infestations in Port Harcourt are one of the causes of roof damage and replacement. Hence, house builders around Port Harcourt especially carpenters do provide counseling/advisory service to intending house owners to treat wooden trusses against termites. The level of awareness and use of preventive measures was moderately above average. House owners that applied preventive measures were likely those that yielded to carpenters' advice. The use of chemicals as dominant measures is similar to the findings of Peterson *et al.* (2006), Ugbomeh and Diboyesuku (2019).

House termite infestations and remedial practices: The results of the termite occurrence and remedial measures practiced by house owners as well as the

factors influencing of the choice their remedial measures are presented in Tables 4 – 7. Termites are popular in human environments and feared by humans, not only by house owners but family members and even tenants for their potential damage they can cause to homes, including furniture, books, and clothes. The pest nature of termites in homes has been probably more widely known than published. Thus, termite's identity through its activity in homes may not require aided diagnosis by the local people as indicated in this study. Termite, popularly known as *Akika* (Table 5) suggests the name as the general identity for termites but other names to be home infested-specific especially among Ikkwerres. In Yoruba occupied domain, Western region, termites are vernacularly known as "*Ikán jẹlé jẹlé*" literally means "termites' house eaters". *Cryptotermes* (powderpost termite) was found to be the devastating species genus infesting dry wood and *Amitermes* genus was found infesting damp wood probably from roof-leaking.

Table 3: Knowledge of house owners about termite proliferation and preventive measures

Parameters	Response	Frequency	Percentage (%)
Awareness of proliferation	Yes	70	50.4
	No	69	49.6
	Total	139	100
Measures	Chemicals	60	43.2
	Non-wood materials	1	0.6
	Chemicals and non-wood materials	29	20.9
	None	49	35.3
	Total	139	100
Chemicals used	Solignum	88	98.9
	Solignum and spent oil	1	1.1
	Total	89	100
Non-wood materials used	Iron doors and windows	26	86.7
	Iron doors	4	13.3
	Total	30	100

Cryptotermes havilandi (Sjostedt) has been documented as a serious termite species of buildings in Port Harcourt (Wilkinson, 1962). Irrespective of the species, termites' activity impacts are essentially the same. Termite infestation as an attack has ravaged many houses as indicated in this study, the worst hit being wooden and older houses. The result of termite infestation occurrences (Table 4) is consistent with those previously reported (Su and Scheffrahn, 2000; Ugbomeh and Diboyesuku, 2019; Novita *et al.*, 2020). In Nigeria, people living together as a community play a crucial role in funding security functions. The non-inclusion of home termite infestations in community development association (CDA) meetings indicates

that house owners never see security of their houses from termite as important at communal level. Inadequate preventive measures expose the houses to continuing infestations by termites. In this study, the applications of varying remedial practices reflect the intensity of termites' infestations as use of chemicals and replacements are the dominant practices. Education, type of house and age of house have very strong drive on factors that influence termite infestation. This result corroborated the findings of Ghaly and Edwards (2011), Debelo and Degaga (2014), Ugbomeh and Diboyesuku (2019), Novita *et al.* (2020).

Table 4: Termite Infestation occurrences in houses

Parameters	Response	Frequency	Percentage (%)
Identification of Termite	Yes	135	94.2
	No	4	2.9
	Total	139	100
Source of Knowledge	Local/indigenous	135	94.2
	No response	4	2.9
	Total	139	100
Infestation occurrence	Yes	73	52.5
	No	66	47.5
	Total	139	100
Parts affected	Walls only	10	13.7
	Roofs only	9	12.3
	Doors and windows	37	50.6
	Roofs, doors and windows	17	23.3
	Total	73	100
Signs of infestation	Tunnels	35	47.9
	Pellets	19	26.0
	Pellets and tunnels	15	20.6
	Mounds and tunnels	4	5.5
	Total	73	100
Severity of infestations	Low	27	37.0
	Moderate	40	54.8
	High	6	8.2
	Total	73	100
Period of severe infestation	Rainy	80	57.6
	Dry	18	12.9
	Rainy and Dry	41	29.5
	Total	139	100
CDA Membership	Yes	54	38.8
	No	85	61.2
	Total	139	100
Discuss of Termite infestation at CDA	No	54	100
	Total	54	100

Table 5: Cross tabulation of Ethnicity and Local name of Termite

Local name	Ethnicity						Total/ (%)
	Ikwerre	Ibo	Efik	Abonema	Isoko	Hausa	
Agwa	1	-	-	-	-	-	1(0.7)
Ahuhu	3	1	-	-	-	-	4(2.9)
Akika	119	1	-	1	-	-	121(87.1)
Apara	2	-	-	-	-	-	2 (1.4)
Ika	1	-	-	-	-	-	1(0.7)
Kurukuru	1	-	-	-	-	-	1(0.7)
Kwarukwasa	-	-	-	-	-	1	1(0.7)
Ndu	1	-	-	-	-	-	1(0.7)
Ntu	1	-	-	-	-	-	1(0.7)
Sakaa	-	-	2	-	-	-	2(1.4)
No Response	-	2	-	-	2	-	4(2.9)
Total	129	4	2	1	2	1	139(100)

Table 6: Remedial strategies practiced by house owners in their houses against termite infestations

Parameters	Response	Frequency	Percentage (%)
Remedial practices	Chemicals	25	34.2
	Replacement	13	17.8
	Scraping	9	12.3
	Cement	1	1.4
	Chemicals and replacement	20	27.4
	Chemicals and scrapping	5	6.8
	Total	73	100
Chemical used	Spent oil	27	54.0
	Kerosene	2	4.0
	Solignum	9	18.0
	Petrol	1	2.0
	DDforce/kerosene	3	6.0
	Spent oil and kerosene	4	8.0
	Solignum and kerosene	3	6.0
	Total	50	100
Remedial efficiency	Yes	69	94.5
	No	4	5.5
	Total	73	100
Efficiency period	Weeks	2	2.7
	Months	36	49.3
	Years	35	47.9
	Total	73	100
Frequency of application	Weekly	1	1.3
	Monthly	28	38.4
	Yearly	16	21.9
	Monthly/Yearly	28	38.4
	Total	73	100

Table 7: Summary of tests for associations

Association Pair	Df	Chi-Square χ^2
Education *Awareness	5	0.069 ^{NS}
Education*Infestation occurrence	5	0.025*
Education*Type of house	10	0.691 ^{NS}
Education*House arrangement	10	0.006*
Type of house* Infestation occurrence	2	0.022*
Age of house* Infestation occurrence	4	0.000*

Conclusions: The study provides control measures results on the house pest (termites) in two communities (Omuoko and Omuihechi) in the Niger Delta region, Nigeria. It provides a piece of evidence for a periodical need for assessment to sustainably manage safe buildings in a highly termite-prone area. The study suggests the critical need for termite infestation control as it constitutes the major pest of house destruction and economic loss in the studied area.

List of Abbreviations

OND: Ordinary National Diploma
 HND: Higher National Diploma
 BSc: Bachelor of Science
 MSc: Master of Science
 PhD: Philosophy Doctor
 CDA: Community Development Association

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