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A Statistical Analysis of Cockroach and Rodent's Infestation with Control Practice Method

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Abstract:
Unfavorable housing conditions in developing communities are strongly associated with increased chances of both rodent and cockroach infestation. This study was carried out to determine the rate of rodents and cockroaches infesting in three communities of Ifelodun Local Government Area of Kwara State and the methods of control practiced by households. Questionaire were administered to 75 households each in the three communities. The study reveals that cockroach's infestation has a higher percentage (68%) compare to rodent's (32%) infestation. Table 2 displays the noticeable evidence of cockroaches and rodents' infestation at homes which revealed that about 40% of the household answered the evidence of 'rat runs' noticed in rooms while 30% are of sighting of live cockroaches as evidence. Local rodenticides and insecticides (Snipper, otapiapia, Kill & Dry, etc) were perceived to be more effective and cheaper as control measures compare to foreign ones. Finally, using MINITAB, our result of test of significance indicates that there is significant difference between rodents' and cockroaches' infestation.
Key words: Cockroach, rodents, infestation, Rodenticide, Insecticide, Sniper, Selected Communities, Ifelodun, Kwara State, Nigeria

1.0 INTRODUCTION

Wang *et al*., 2008 and Sarinho *et al*., 2004 opined that pest infestation is a known residential danger that has been connected with higher risk of upper respratory tract infection like asthma symptoms. Bonner *et al*., 2007 and Bradman *et al*., 2005 in their case case opined that Lassa fever is caused by rodents (***Rattus norvegicus* and *Rattus rattus*)**. As a result of inadequate maintenance of existing residences and environs, a disproportionately high incidence of pest infestation occurs, arising from poor hygiene and improper storage and disposal of waste (Bradman *et al., 2005*, Wang *et al*., 2008 and Bamigboye, 2006). Majekodunmi *et al*., 2002 and Onyido *et al*., 2009 concluded that poor housing conditions in both urban and rural communities leding to overcrowding of limited residential duildings in Nigerian communities, provide plentiful habourage for pest infestation due to unsanitary stacking of food items, as well as congestion of rooms with varieties of articles. The alarming incidence of cockroaches in public housing apartments poses numerous public health risks, including exposure to allergens through the air and via food contamination, resulting in an increased incidence of health problems, mainly asthma (Wang *et al*., 2008 and Lwebuga-Mukasa *et al*., 2002). Cockroaches can also transmit many pathogens including bacteria, viruses, fungi, protozoa and pathogenic helminthes that threaten human health (Pai *et al*., 2004 and Ghosh and Gayen, 2006).

Rodents infestation has long been associated with risk of Lassa fever epidemics and the transmission of many serious diseases including hantavirus pulmonary syndrome, salmonella, murine typhus, plague, rat bite fever, and leptospirosis (Fisher and Miller, 2003,and Bonner *et al*., 2007). Lassa fever is endemic in West Africa and has been reported from Sierra Leone, Guinea, Liberia, and Nigeria. Some studies indicate that 300,000 to 500,000 cases of Lassa fever and 5000 deaths occur yearly across West Africa (Ogbua *et al*., 2007). The synergistic health and economic consequences of rodents and cockroach infestation is resulting to the use of home pesticide for their control, a situation that increases indoor pesticide residue (Arlian, 2002). That adverse housing condition in homes and hostels is strongly associated with increased odds of both rodent and cockroach infestation is not in doubt.

The extent of infestation, destruction caused to property, the species involved and their perceived importance, is yet to attract the required research interest in Nigeria. The objective of this study therefore is to look at these rodents and cockroach infestation in three communities and control practice by residents. The findings of this study will be used to design and develop pest control strategies that will be effective and more economical to developing Nigeria communities.

Fig 1: Picture of Cockroaches
Source: Field study 2015

Fig 2: Picture of House Rat
Source: https://www.google.com. rodents+pictures.pdf

2.0 MATERIALS AND METHODS

2.1 Description of the Study Area

The study was conducted at three communities (Igbaja, Okeya and Babanla) area of Ifelodun local Government of Kwara state between March and May, 2014. Ifelodun Local Government is the largest local Government in Kwara State in Nigeria. Kwara State has two seasons called the rainy and dry season, as rainfall is the real climatic variable.

The rainy season is from May to November while the dry season runs from December to May. Bamigboye, 2006 opined that common feature of most Nigerian developing communities is keeping the surroundings untidy, poor drainage system and stocking of foodstuffs by residents inside their rooms, especially under their beds and inside the wardrobe. Significant among the problems faced in these communites digging of suck away without proper finishing and uncovered wells which are generating rodents and cockroaches. Moreso are the increased volume of garbage generated and poor strategies for disposal and hygiene.

2.2 Selection of Residence and Participants

In this research work, thirty houses were randomly selected in each from the three communities, and in each of the selected communities, the elderly persons were identified to provide information on students' attitude and practices towards cockroach and rodent infestation. Questionaire was designed and administered to these residents and were interviwed to get more information from them. Their local dialect (Yoruba) was also used to inquire information from those who could not read and the elderly ones.

In order to solicit occupants' cooperation and participation throughout the period of the study, advocacy visits were made to each of the selected houses. A semi-structured questionnaire was administered to the residents. The questions investigated activities of cockroaches and rodents in the rooms, methods of control employed by residents and their own view if level of satis faction of the control method employed.

2.3 Methods of Trapping Cockroaches and Rodents in These Communities

There was a general response that rodenticides were generally not affordable by majority of the households and were also of the view that these rodenticides ewre no longer effective in killing rats, and this has resulted in the use of locally prepared rodenticides

(Otapiapia, Kill and dry, Indocid and Sniper). Less than 5% were able to afford for the Hercules mouse glue board, measuring 30 cm in length and 20 cm in width. This was also applicable in terms of cockroach control, very few households were able to afford for the sprays like Mortein, Bop, Baygon, Mobil, etc. Snipper and Pestiside powder was also used by most households in control of cockraches.

2.4 Method of Analysis

Data was analyzed using percentages and frequencies while chi-square was used to test for level of significance using **MINITAB 17**. Moreso, multiple bar chart was also used for graphical representation of our findings. The stated hypothesis this research work is:

H_0: There is no significant difference between Cockroaches and Rodents infestation in these communities.

3.0 DATA ANALYSIS

The samples of study which include 75 households and the result is as displayed below:

Table 1: Distribution Table of Cockroaches and Rodents infestation in The Three Communities

COMMUNITY	No. of houses infested by rodents	No. of houses infested by cockroaches	No. of houses infested by both rodents & cockroaches	No. of houses investigated
1	8 (10.67%)	17 (22.67%)	6 (8.00%)	25
2	6 (8.00%)	19 (25.33%)	6 (8.00%)	25
3	10 (13.33%)	15 (20%)	5 (6.67%)	25
Total	24	51	17	**75**

It can be observed from the table above that the percentage of cockroach's infestation is of higher percentage compare to rodent's infestation. This can also be seen in figure 3 below.

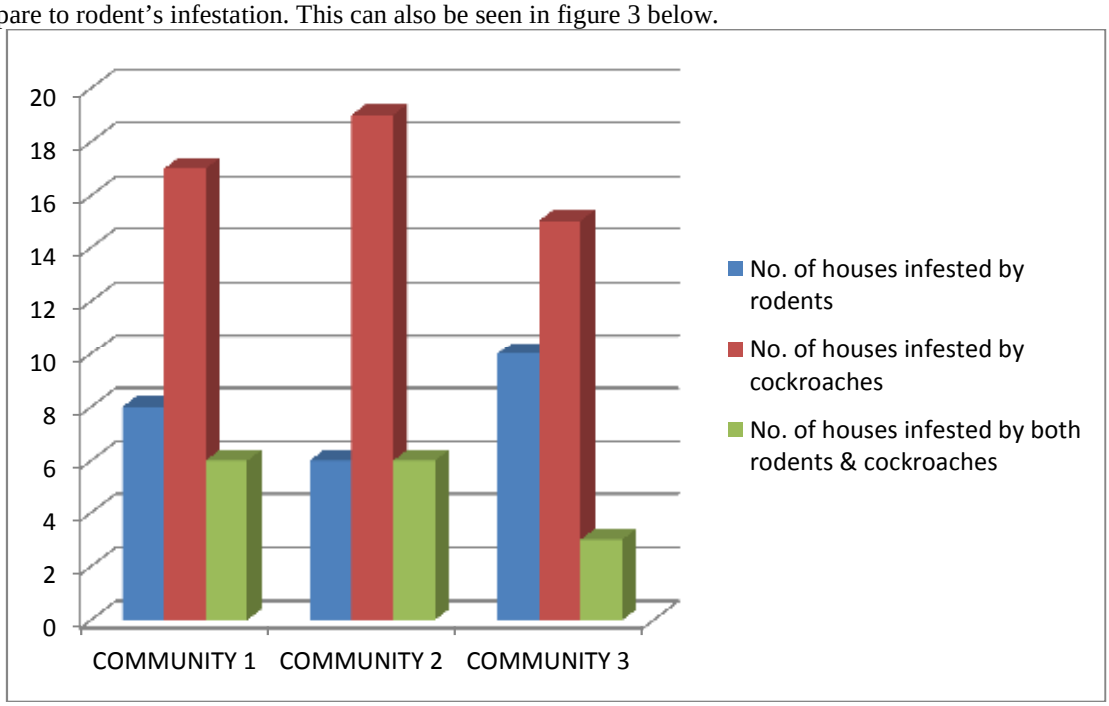

Fig 3: Multiple Bar chart on Cockroaches and Rodents infestation

Table 2: Distribution Table of Households' Noticeable Evidence of Cockroaches and Rodents' Infestation

Indicators of rodents infestation	Frequency	Percentage
• Rat runs noticed in rooms	30	(40.00%)
• Rate droppings	9	(12.00%)
• Hole in cupboards	5	(6.67%)
• Live rats frequently sighted inside cupboards	11	(14.67%)
• Rat bites noticed in food stuffs	7	(9.33%)
• Rat noise heard	15	(20.00%)
• No evidence of rat infestation	6	(8.00%)
• Cockroach droppings found on floor and in cupboards	17	(22.67%)
• Cockroach egg cases found on floor and in cupboards	10	(13.33%)
• Odorous smell of cockroaches perceived	15	(20.00%)
• Sighting of live cockroaches	23	(30.67%)

The table above displays the noticeable evidence of cockroaches and rodents' infestation at homes. It was however noticed that about 40% of the household answered the evidence of 'rat runs' noticed in rooms while 30% are of sighting of live cockroaches as evidence.

Table 3: Respondents' Methods of Rodent and Cockroach Control Methods

Adopted control Method	Frequency	Percentage
Rodents	5	(6.67%)
• Use of traps/ Glue board	10	(13.33%)
• Physical Killing	50	(66.67%)
• Rat poison (Kill and dry, Indocid, etc)	6	(8.00%)
• Blockage of Holes	4	(5.33%)
• Never did anything		
Cockroaches		
• Use of Insecticides (Mortein, Mobil, etc)	20	(26.67%)
• Physical Killing	8	(10.67%)
• Use of Glue board	5	(6.67%)
• Use of Sniper	32	(42.67%)
• Use of DDForce	5	(6.67%)
• Never did anything	5	(6.67%)
Total	**75**	**100**

About 67 percent uses rat poison in controlling rodents' infestation while about 43 percent uses a common local insecticide (SNIPER) in controlling cockroaches. These set of respondents who contribute a higher percentage of the entire sampled population were also of the opinion that the use of our locally made insecticides (Snipper, otapiapia, Kill & Dry, etc) are more effective and cheaper as control measures compare to the foreign produced ones which were perceived to be very expensive and less or not effective.

3.1 Test of Significance

In order to test if there exist any significant difference between cockroach and rodent infestation, we carried out chi-square test using MINITAB 17 at $\alpha = 0.05$ significant level and the result is as displayed below:

Chi-Square Test: Community 1, Community 2, Community 3

Expected counts are printed below observed counts

	COMM 1	COMM 2	COMM 3	Total
1	8	6	10	24
	8.09	(8.09)	(7.83)	
2	17	19	15	51
	17.18	(17.18)	(16.63)	
3	(6)	6	5	17
	5.73	(5.73)	(5.54)	
Total	31	31	30	92

Chi-Sq = 0.001 + 0.539 + 0.604 + 0.002 + 0.192 + 0.160 + 0.013 + 0.013 + 0.053 = **1.576**
DF = **4**, P-Value = **0.813**

The MINITAB result displayed above indicates that there is significant difference between rodents' and cockroaches' infestation. Therefore, the null hypothesis that there exist is no significant difference between Cockroaches and Rodents infestation in these communities is therefore rejected. Our also revealed that the rate of cocckroach infestation is far higher compared to rodents' infestation.

4.0 RESLT

From table 1 and figure 1, it was observed that the percentage of cockroach's infestation has a higher percentage (68%) compare to rodent's (32%) infestation. Table 2 displays the noticeable evidence of cockroaches and rodents' infestation at homes. It was however noticed that about 40% of the household answered the evidence of 'rat runs' noticed in rooms while 30% are of sighting of live cockroaches as evidence.

Moreso, 67 % uses rat poison in controlling rodents' infestation while about 43 percent uses a common local insecticide (SNIPER) in controlling cockroaches. These set of respondents who contribute a higher percentage of the entire sampled population were also of the opinion that the use of our locally made insecticides (Snipper, otapiapia, Kill & Dry, etc) are more effective and cheaper as control measures compare to the foreign produced ones which were perceived to be very expensive and less or not effective.

Finally, MINITAB result indicates that there is significant difference between rodents' and cockroaches' infestation.

5.0 CONCLUSION

The result reveals that the cockroach's infestation has a higher than rodent's infestation. Moreso, those who uses rat poison and locally made insecticide in controlling rodents' and cockroaces infestation believe that the locally made insecticides (Snipper, otapiapia, Kill & Dry, etc) are more effective and cheaper as control measures compare to the foreign produced ones which were perceived to be very expensive and less or not effective.

Conclusively, Therefore, the null hypothesis that there exist is no significant difference between Cockroaches and Rodents infestation in these communities is therefore rejected.

6.0 RECOMMENDATION

The only real control that can be obtained safely is to reduce the sources of food, water and the harborage points rodents and cockroaches need to survive. For the rodents/pest control to be brought a to reasonable minimal level, we recommend the following:

1. Prevention - Change the conditions conducive to infestation. First eliminate clutter, especially any/all corrugated cardboard, paper and empty bags, pallets and debris which provide hiding places or shelter for rodents and cockroaches.

2. Good Sanitation - Continue to eliminate clutter. Adopt cleaning standards that daily reduce the amount of available harborage, garbage, food and water.
3. Rodenticides and Insecticides – The locally made insecticides (Snipper, otapiapia, Kill & Dry, etc) percieved to be better may be used and should be applies with safety precaution.

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