ACADEMIC SCIENCE PRESS

INTERNATIONAL JOURNAL OF MODERN MEDICINE AND NATURAL SCIENCES
ISSN: 3143-6153

Common Insects found in Male and Female Hostels of Adeyemi Federal University of Education, Ondo (AFUED): Implications for Public Health among undergraduates

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ARTICLE INFO

Keywords:
urban entomology,
insect vectors,
university hostels,
public health,
integrated pest management,
AFUED.

Vol.01, **No**.02, 2026

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ABSTRACT

Densely occupied university hostels in tropical West Africa provide favourable microenvironments for synanthropic insects, many of which are established vectors of pathogens of public health importance. Systematic entomological documentation of hostel insect fauna remains scarce for Nigerian tertiary institutions of learning. This study characterised the species composition and relative abundance of insects in six undergraduate hostels three male and three female at Adeyemi Federal University of Education, Ondo (AFUED), and examined the public health implications of the observed insect burden. A four-week entomological survey combining direct visual observation with sticky, light, and pitfall trapping was conducted across sleeping quarters, kitchens, bathrooms, and corridors of the Loyo, Tetfund, and Oba Victor Kiladejo male hostels and the Café, Tetfund, and Wande Abimbola female hostels. Specimens were identified morphologically using standard entomological keys and enumerated per hostel. Thirteen insect taxa were recorded, comprising cockroaches, sugar ants, soldier ants, houseflies, blowflies, moths, house crickets, weevils, beetles, butterflies, mantids, variegated grasshoppers, and mosquitoes. Soldier ants were numerically dominant in every hostel (minimum counts exceeding 1,000), followed by houseflies (541–671) and mosquitoes (minimum counts of 100–123). The Tetfund female hostel recorded the highest overall insect burden, including the highest soldier ant (>1,500) and cockroach (285) counts. The consistently high density of medically important insects across both male and female hostels indicates systemic gaps in sanitation, waste management, and structural maintenance at AFUED. Sustained integrated pest management, improved sanitation infrastructure, and targeted health education are recommended to protect undergraduate health and wellbeing.

Introduction

University hostels accommodate large numbers of students within shared, often densely populated living quarters. These conditions create microenvironments that are conducive to insect proliferation, particularly where sanitation practices are inadequate, food storage is improper, or structural maintenance is deficient (World Health Organization [WHO], 2023). In sub-Saharan Africa, student housing is a recurring focus of urban entomology and vector-control research, reflecting the combined pressure of a warm tropical climate and persistent infrastructural and hygiene challenges on institutional campuses (Ombugadu *et al*., 2020; Onah *et al*., 2023).

Insects such as cockroaches (*Periplaneta americana, Blattella germanica*), houseflies (*Musca domestica*), mosquitoes (*Anopheles* spp., *Culex* spp.), and ants are well-documented vectors of pathogenic microorganisms, including bacteria, protozoa, helminths, and viruses (Fotedar *et al*., 1991; Graczyk *et al*., 2005; Rivault *et al*., 1993). These organisms mechanically or biologically transmit diseases such as malaria, typhoid fever, cholera, dysentery, and food poisoning conditions that disproportionately affect young adults living in crowded communal settings (Pritt *et al*., 2014). Recent Nigerian hostel-based surveys reinforce this concern: cockroach infestations spanning multiple pathogenic bacterial and parasitic taxa have been documented in student hostels at the University of Jos (Onah *et al*., 2023) and Kaduna State University (Nwoye *et al*., 2025), while a baseline mosquito survey

of hostels at the Federal University of Lafia recorded indoor resting densities sufficient to sustain regular human vector contact (Ombugadu *et al*., 2020).

Adeyemi Federal University of Education, Ondo (AFUED), a leading teacher-training institution in southwestern Nigeria, houses thousands of undergraduate students in on-campus hostels. Despite a growing student population, systematic entomological surveys of AFUED hostels remain absent from the published literature. Understanding the types and abundance of insect fauna in these environments is a necessary first step toward evidence-based, targeted public health interventions.

This study therefore aimed to: (1) document the species composition and frequency of insects in male and female hostels at AFUED; (2) compare insect burdens across hostels by gender designation; and (3) discuss the public health implications of the observed insect distributions for the undergraduate population.

2. Materials and Methods

2.1: Study Area

The study was conducted at Adeyemi Federal University of Education, Ondo (AFUED), located in Ondo Town, Ondo State, southwestern Nigeria (latitude 7.09°N, longitude 4.84°E). AFUED lies within the tropical rainforest zone, characterised by high temperatures (annual mean 26–30°C) and a bimodal rainfall pattern. Six student hostels were purposively selected for the survey: three male hostels (Loyo, Tetfund, and Oba Victor Kiladejo) and three female hostels (Café, Tetfund Female, and Wande Abimbola).

2.2: Entomological Survey Design

Insect surveys combined direct visual observation with mechanical trapping (sticky traps, light traps, and pitfall traps) deployed across common areas, sleeping quarters, kitchens, bathrooms, and corridors of each hostel. Surveys were conducted over a four-week period during the academic semester. Insects were counted in situ where feasible; specimens that could not be identified immediately were collected into sterile containers and identified morphologically using standard entomological keys (Daly *et al*., 1998; Scholtz & Holm, 1985).

2.3: Data Analysis

Frequency data for each insect taxon per hostel were recorded and tabulated. Where counts were large or highly dynamic (e.g., ants, mosquitoes), minimum threshold values are reported and denoted with the symbol ">". Data were summarised descriptively, and comparisons between male and female hostels were made using aggregated insect frequency totals. All counts are expressed as absolute frequencies per hostel for the four-week survey period.

3. Results

3.1: Overview of Insect Species Recorded

A total of thirteen insect taxa were recorded across the six AFUED hostels: cockroaches, sugar ants, soldier ants, houseflies, blowflies, moths, house crickets, weevils, beetles, butterflies, mantids, variegated grasshoppers, and mosquitoes. Table 1 presents the complete frequency distribution by hostel.

Table 1

Frequency Distribution of Insect Populations Recorded in AFUED Student Hostels

Insect Taxon	Loyo (M)	Tetfund (M)	Oba Victor Kiladejo (M)	Café (F)	Tetfund (F)	Wande Abimbola (F)
Cockroaches	225	201	225	252	285	125
Sugar ants	>150	>100	>150	>100	>250	>115
Soldier ants	>1,000	>1,020	>1,000	>1,004	>1,500	>1,003
Houseflies	571	617	571	570	541	671
Blowflies	103	144	103	100	10	93
Moths	48	32	48	45	40	38
House crickets	22	16	22	20	29	42
Weevils	>179	>139	>179	>79	>199	>149
Beetles	35	53	35	33	57	49
Butterflies	77	69	77	70	70	85

Insect Taxon	Loyo (M)	Tetfund (M)	Oba Victor Kiladejo (M)	Café (F)	Tetfund (F)	Wande Abimbola (F)
Mantids	23	32	23	28	28	31
Variegated grasshoppers	65	56	65	60	75	69
Mosquitoes	>100	>117	>100	>110	>103	>123

Note. M = male hostel; F = female hostel; ">" denotes a minimum threshold count for taxa too numerous or mobile to enumerate exhaustively.

3.2: Dominant Insect Groups

Soldier ants (*Dorylus* spp. or *Oecophylla* spp.) were the numerically dominant insects across all hostels, with minimum counts exceeding 1,000 individuals per hostel during the survey period; the Tetfund female hostel recorded the highest soldier ant burden (>1,500). Houseflies (Musca domestica) ranked second in overall abundance, with counts ranging from 541 (Tetfund female) to 671 (Wande Abimbola). Mosquitoes, reported as minimum threshold values (>100 to >123), were ubiquitous across all six hostels.

Cockroaches were recorded in substantial numbers across all hostels, with the Tetfund female hostel reporting the highest count (285) and the Wande Abimbola female hostel the lowest (125). Weevil populations, though expressed as minimums, were considerable in most hostels, particularly Tetfund female (>199) and Loyo male (>179), suggesting widespread infestation of stored food items.

3.3: Comparison between Male and Female Hostels

Insect diversity and abundance were broadly similar between male and female hostels, indicating that all surveyed hostels face comparable entomological pressures irrespective of gender designation. Female hostels recorded a marginally higher mean cockroach count (220.7) than male hostels (217.0). The Wande Abimbola female hostel reported the highest housefly count of any hostel (671), while the Tetfund female hostel recorded an exceptionally high soldier ant count (>1,500), notably above any male hostel value. Blowfly counts varied markedly, with Tetfund female recording only 10 individuals compared with 144 in Tetfund male a discrepancy that likely reflects differences in refuse management and proximity to decomposing organic matter between the two facilities.

4. Discussion

4.1: Cockroaches as indicators of poor sanitation

The substantial cockroach populations recorded across all AFUED hostels are consistent with findings from comparable Nigerian tertiary-institution surveys. A 2025 hostel survey at Kaduna State University similarly documented high cockroach prevalence, dominated by *Blattella germanica* and *Periplaneta americana*, and higher infestation in female than male hostels (Nwoye *et al*., 2025) — a pattern that mirrors the marginally elevated female-hostel counts observed in the present study. A multi-state Nigerian investigation that included student hostels at the University of Jos further confirmed cockroaches recovered from hostel environments to carry *Escherichia coli*, *Salmonella* species, and intestinal parasites including *Entamoeba histolytica* (Onah *et al*., 2023). Cockroaches are known to harbour and mechanically transmit pathogens such as *Salmonella typhi, Escherichia coli*, and *Staphylococcus aureus* on their bodies, legs, and digestive tracts (Fotedar *et al*., 1991; Rivault *et al*., 1993), and their presence in AFUED hostel kitchens, bathrooms, and food-storage areas therefore poses a direct risk of gastrointestinal infection and food contamination among resident students.

4.2: Houseflies and Foodborne Disease Risk

The high housefly counts recorded in this study ranging from 541 to 671 individuals per hostel represent a considerable foodborne disease risk. *Musca domestica* is an established mechanical vector of numerous pathogens, including causative agents of typhoid fever, cholera, dysentery, and helminthic infection (Graczyk *et al*., 2005). Flies breed prolifically in decomposing organic matter, faeces, and improperly managed waste, conditions frequently associated with hostel environments in resource-limited settings. The particularly high fly count recorded at the Wande Abimbola female hostel may indicate proximity to waste-disposal points or inadequate refuse management in that facility.

4.3: Mosquitoes and Vector-Borne Disease

Mosquitoes were recorded in all six hostels, with minimum counts exceeding 100 per hostel. A baseline entomological survey of student hostels at the Federal University of Lafia similarly documented *Anopheles gambiae* and *Culex quinquefasciatus* as the predominant indoor-resting species, together with an indoor resting density sufficient to sustain regular human–vector contact (Ombugadu *et al*., 2020). Nigeria continues to carry the largest national share of the global malaria burden, accounting for roughly 30% of malaria deaths worldwide in the most recent reporting cycle (WHO, 2024a). Against this backdrop, the mosquito densities observed in AFUED hostels place resident students at elevated risk of malaria transmission, particularly where insecticide-treated nets and other protective measures are not consistently used.

4.4: Ants, Weevils, and Food Contamination

Soldier ants recorded the highest insect counts of any taxon across all hostels, with minimum counts exceeding 1,000 per hostel. While not pathogen vectors in the classical sense, soldier ants can contaminate food and water sources and, in large numbers, cause physical distress and sleep disruption, both of which may affect academic performance and general wellbeing. Sugar ants similarly infiltrate food-storage areas in comparable numbers.

Weevils (Coleoptera: Curculionidae), recorded in all hostels at substantial minimum counts, are notorious stored-product pests. Their presence strongly suggests infestation of grain stores, cereals, dried legumes, and other food staples kept by students. Beyond the direct economic loss this represents, weevil-damaged grain is more susceptible to colonisation by toxigenic fungi; a household-level dietary risk assessment conducted in north-central Nigeria found aflatoxins and other mycotoxins present in cereals, nuts, and legumes typical of student diets, alongside low consumer awareness of the associated health risks (Ezekiel *et al*., 2021). Weevil infestation of AFUED hostel food stores therefore raises a plausible, if indirect, concern regarding mycotoxin exposure and allergic reactions among students consuming affected staples.

4.5: Ecological and Non-Vector Insects

Insects such as butterflies, mantids, moths, house crickets, and variegated grasshoppers, while generally not disease vectors, are indicative of a permeable and poorly sealed hostel environment. Their presence suggests openings in windows, doors, and other structural elements through which more medically important vectors can also enter. Mantids and beetles may additionally indicate damp, vegetated conditions adjacent to hostel buildings. The psychological and sleep-disruptive effects of insects in living quarters, even non-vector species should not be overlooked when evaluating overall student welfare.

5. Public Health Implications

The entomological findings of this study carry substantial implications for the health, academic performance, and quality of life of undergraduate students at AFUED. The co-occurrence of multiple medically important insect groups including mosquitoes, cockroaches, and houseflies in all six hostels surveyed creates conditions favourable to the simultaneous transmission of several infectious diseases. Students who are already immunologically stressed by academic pressure, nutritional deficiencies, or overcrowded living conditions may be particularly vulnerable to these exposures.

Specific disease risks identified in this study include: (1) malaria transmission from Anopheles mosquitoes, a recognised cause of absenteeism and morbidity among Nigerian university students (WHO, 2024a, 2024b); (2) typhoid fever and cholera arising from housefly- and cockroach-mediated contamination of food and water; (3) potential mycotoxin exposure linked to weevil infestation of grain stores (Ezekiel *et al*., 2021); (4) allergic and dermatological reactions associated with cockroach allergens; and (5) psychological stress and sleep disturbance resulting from high overall insect density in sleeping quarters.

At the institutional level, insect-related illness increases healthcare demand, reduces academic productivity, and may contribute to student dissatisfaction. The university's health and facilities-management units should therefore treat the insect infestations documented here as a matter of institutional priority rather than a routine maintenance issue.

6. Conclusion

This study provides the first systematic documentation of insect fauna in AFUED student hostels, recording thirteen insect taxa across six hostels, with soldier ants, houseflies, cockroaches, and mosquitoes predominating. The abundance and diversity of medically important insects across both male and female hostels indicate systemic challenges in sanitation, waste management, and structural maintenance at AFUED. Given the established vector roles of several identified taxa, particularly mosquitoes, cockroaches, and houseflies, these findings underscore a significant and previously undocumented public health burden facing AFUED undergraduates. Prompt, sustained, and multi-pronged pest-management interventions, paired with robust health education, are needed to protect student health and uphold the standards of a safe learning environment.

7. Recommendations

Based on the findings of this study, the following recommendations are made for AFUED management, students, and health authorities:

1. Integrated Pest Management (IPM): AFUED should implement a comprehensive IPM programme combining targeted chemical control, biological control using natural predators, and environmental management (waste reduction and structural repairs) across all hostels.

2. Improved Sanitation Infrastructure: Regular and thorough cleaning of hostels, functional waste-management systems, and timely repair of broken drains, pipes, and structural openings are essential to reducing insect breeding sites.

3. Food Storage Education: Students should be educated on proper food-storage practices, including the use of airtight containers and refrigeration, to reduce weevil infestation and limit food contamination by cockroaches and flies.

4. Provision of Mosquito Nets: The university should facilitate distribution or subsidised purchase of insecticide-treated nets (ITNs) for hostel residents, given the high mosquito density recorded and Nigeria's continuing high national malaria burden (WHO, 2024a).

5. Routine Entomological Monitoring: Periodic, systematic insect surveys should be institutionalised within AFUED's health and environmental management framework to track infestation trends and evaluate the effectiveness of interventions.

6. Health Education Programmes: The university health centre should conduct regular seminars and workshops on vector-borne and insect-related diseases, targeting hostel residents and hostel management staff.

7. Structural Improvements: Installation of window screens, door sweeps, and mesh guards across all hostel buildings would meaningfully reduce insect entry and indoor populations.

Conflict of Interest

The author declares no conflict of interest in connection with this study.

Acknowledgements

The author expresses gratitude to the hostel administrators and student representatives at AFUED for facilitating access during the survey period, and to the technical staff of the Department of Biology for support with specimen identification.

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