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RELATIVE ABUNDANCE OF SYNANTHROPIC FLIES WITHIN MAKURDI METROPOLIS

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Abstract

Synanthropic flies are adapted to live in close association with human habitations and are capable of transmitting human pathogens either mechanically or biologically through this close relationship. This research determines the relative abundance of synanthropic flies within Makurdi metropolis. A large wooden fly trap box whose inside was lined with aluminum foil was constructed. A well-cut and fitted mosquito net was attached properly by the sides of the box and opened halfway on top and bait (stale fish and meat) was placed inside the box to attract flies to enter the box. The box was quickly covered with the remaining half of the mosquito net when a good number of flies had amassed sufficiently on the bait (stale fish). Flies were caught from four locations in Makurdi: Benue State University, Wadata market, Wurrukum market, and Akphehe Market. This setup was allowed to stand for 25-30 minutes to allow the flies to get attracted to the bait. And an insecticide was used to spray through the mosquito net to kill the flies before picking using forceps. A hand lens and disserting Microscope was used to examine flies which were then identified and sorted out into species using taxonomic keys (Greenberg, 1973). A total of 285 species of S. flies were sampled from different locations within Makurdi metropolis; wadata market, BSU, Wurukum market, and Akpehe market respectively. Identified species were Musca domestica (94.0%), Chrysoma putoria 15(5.3%), and Muca sorbens (0.7 %) respectively.Prevalence of Synatropic flies across sample locations were also evaluated in this study, result showed that wadata market had the highest prevalence 93(32.6%) followed by wurukum market 77 (24.9%) and BSU 44 (15.4%) respectively. Based on distribution, result showed that Musca domestica had the highest prevalence in both Locations given a total of 268(94.0), followed by chrysoma putoria 15(4.6%) while musca sorbeans 2(0.7%) had the least prevalence. This study illustrates the diversity of synanthropic flies collected in various human localities within Makurdi local government area of Benue state. Three species (Musca domestica, Chrysoma putoria, and muca sorbens) are identified as the most relative abundance of synanthropic flies within Makurdi metropolis. There is need to institute a functional control measures such as community health awareness and enforcement of strict environmental sanitation programme to reduce mechanical transmission.

KEYWORDS: *Flies, Abundance, Synanthropic, Distribution, Pathogens and Diseases.*

1.0.INTRODUCTION

Synanthropic flies are those flies which are adapted to live in close association with human habitations and are capable of transmitting human pathogens either mechanically or biologically through this close relationship (Gabre and AbouZied 2003). The link between human pathogens and fly transmission is due to the fact that adults feed on animal manure, trash, human excrement, and other decaying materials; readily moving between these habitats and food, food preparation surfaces, and humans themselves (Graczyk *et al.*, 2001). Species of flies in the families Muscidae (house flies, latrine flies, and relatives), the Calliphoridae (blow flies and bottle flies), and the Sarcophagidae (flesh flies) have evolved to live in close association with human development.

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Over 50 species of synanthropic flies have been reported to be associated with unsanitary conditions and involved in the dissemination of human pathogens in the environment (Nmorsi *et al*., 2016). Based on synanthropy, endophily (preference for entering into buildings), communicative behaviour, and strong attraction to filth and human food, various species of filth flies have been involved in the transmission of human gastrointestinal diseases (Nmorsi *et al*., 2016).Such species include *Hermetia illuscens, Megaseliainsulana, Eristalis tenax, Piophila casei, Fannia canicularis,Musca domestica, Muscina stabulans, Stomoxys calcitrans, Calliphora vicina, Calliphora vomitoria, Chrysomya putoria, Cynomyopsiscadaverina, Cochliomyia macellaria, Phaenicia cuprina,Phaenicia sericata, Phormia regina, Sarcophaga crassipalpis, Sarcophagacarneria, and Sarcophaga haemorrhoidalis* (Olsen, 2014).

Promiscuous-landing synanthropic flies are known transport hosts for a variety of pathogens of public health importance (Nmorsi *et al*., 2006). They are natural carriers of pathogens such as viruses, bacteria, fungi, and parasites for which they play a considerable role in their transmission in different parts of the world (Banjo *et al*., 2015). Synanthropic flies are responsible for the spread of zoonotic diseases (Mian and Jacal, 2002). The population densities of synanthropic flies are largely tied to sanitation practices such that they are abundant in both urban and rural areas where unsanitary conditions exist and are usually scarce where sanitary conditions are enforced (Chaiwong *et al.*, 2012). Synanthropic flies include the house-/domestic- and coprophilic flies such as *Musca domestica, Eucalliphora lilea, Fannia scalaris, Chrysomya megacephala, Calliphora vomitoria, Stomoxys calcitrans and Luciliasericata* which have been implicated in the transmission of intestinal parasites (Graczyk *et al*., 2005 and Nmorsi *et al*., 2006).

The feeding mechanism and the filthy habit of synanthropic flies make them efficient mechanical vectors and transmitters of human enteric parasites (Nmorsi *et al*., 2016). The common house fly (*Muscadomestica*), has been identified as the most promiscuous mechanical vector of pathogens of gastrointestinal illness and has been documented in various parts of the world (Greenberg, 1973 and Banjo *et al*., 2005).In tropical Africa, poor sanitary condition, poor waste management, and indiscriminate disposal of wastes such as faeces and refuse contribute to the proliferation of synanthropic flies in the communities which can lead to the spread of intestinal parasites and other infections (Nmorsi *et al*., 2006).

Synanthropic flies pick up bacteria, parasites, fungi, and viruses and then spread these pathogens by contaminating food and water. Several health problems can develop from synanthropic flies infestations. These include food poisoning, dysentery, and tuberculosis and other parasites related infections. This knowledge of determining the diversity and abundance of synanthropic flies will help to estimate at least some species carried by synanthropic flies and understanding the life cycle and interaction of these organisms with their habitat, which is often key of understanding the dynamics of ecosystems generally and prevent flies from coming in contact with our food (El-Sherbini, et al, 2011).

The key to fly control is sanitation. Adult flies are attracted by the odors of food or trash. Organic material may serve as food for adult flies or as a breeding place for fly larvae. Trash should be placed into bags and stored in sound trashcans with tight-fitting lids. Trashcans and dumpsters must be kept clean. Food scraps and spilled beverages will attract flies. Decaying organic material, like animal droppings, which might be a breeding place for flies should be removed (World Health Organization 2019). For exclusion, flies should be kept from entering buildings. Windows and doors need to have good screens. Cracks and other openings that may let flies into a building should be repaired. Businesses should have doors that open outwardly to prevent flies from being drawn into the building. Equip doors with self-closing devices. Exhaust vents and air intakes should be screened. It is important to place dumpsters and trashcans as far from entrances as possible. Plantings should be away from doors so that flies will not rest near entrances (World Health Organization 2019). There are some good mechanical devices that can be used around homes and businesses to control flies. Sticky traps can be hung to catch flies in buildings or outdoors. For commercial establishments, air doors, when properly installed, can prevent flies from entering buildings. Ultra-violet (UV) light traps work very well for controlling flies inside commercial buildings. It is important to position these UV traps correctly. They should be placed indoors, away from windows, and cantered about three feet above the ground. UV traps should not be placed too close to food or surfaces on which it is prepared. Devices that produce ultrasound are not considered to be effective for controlling any insects, including flies (World Health Organization 2019).

2.0 MATERIALS AND METHODS

2.1 Study Area

Makurdi is the capital of Benue State; politically it was demographically established in the early twenties and gained prominence in 1927 when it became the headquarters of the Benue Province. Its commercial status was further enhanced when the Railway Bridge was completed and opened in 1932. Makurdi lies between latitude 7° 43' 50" N and longitude 8° 32' 10" E. It shares boundaries with Guma Local Government North East, Gwer to the South, Gwer-West to the West, and Doma Local Government Area of Nasarawa State to the North-West. The town houses two universities: Federal University of Agriculture and Benue State University.

The town is predominantly an Agricultural area specializing in cash crops and subsistence crops. As from June to November when the Niger River has high water, Makurdi servers as a port from which goods including locally grown sesame seeds and cotton are shipped to Lokoja (126 miles [203km] West at the Niger - Benue Confluence) and to Niger River Dental Ports. The town is also a local trade center for yams, sorghum, millet, rice, cassava, Shea nuts, sesame oil, peanuts (groundnuts), soybeans, and cotton (Onu J.C, 2018).

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The climatic condition in Makurdi is influenced by two air masses: the warm moist south Westerly air mass, and warm, dry North - Easterly air mass. In Makurdi, the wet season is oppressive and overcast, the dry season is humid and partly cloudy, and it is hot almost year-round. Over the course of the year, the temperature typically varies from 63°F to 94°F and is rarely below 57°F or above 99°F and the mean annual rainfall of approximately: 1, 290m is usually obtained almost every raining season in Makurdi yearly. Makurdi local government area is populated with some location having poor sanitary facilities, poor water management practices, and indiscriminate disposal of waste materials which are contributory factors for proliferation of synanthropic flies in the study areas (Hilakaan and Ogwuche, 2014).

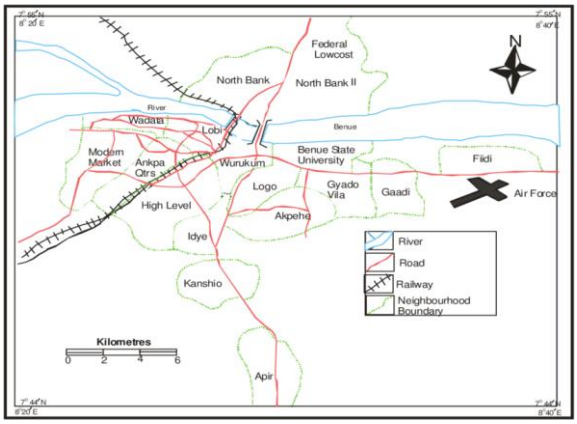

Figure 1: Map of Makurdi Showing Study Area.
Source: Benue State Ministry of Lands, Survey and Solid Minerals (2011).

2.2 Sample Collection

A large wooden fly trap box whose inside was lined with aluminum foil was constructed. A well-cut and fitted mosquito net was attached properly by the sides of the box and opened half way on top. Bait (stale fish and meat) was placed inside the box to attract flies to enter the box. The box was quickly covered with the remaining half of the mosquito net when a good number of flies had amassed sufficiently on the bait (stale fish). Flies were caught from four strategically seleted locations in Makurdi: Benue State University, Wadata market, Wurrukum market, and Akphehe Market. The fly trap boxes were placed in residential areas where flies were seen around. This setup was allowed to stand for 25-30 minutes to allow the flies to get attracted to the bait. An insecticide was used to spray through the mosquito net to kill the flies. Flies were removed using forceps into a Petri dish and transported immediately to Microbiology Laboratory of the Department of Biological Science, Benue State University, Makurdi, for assessment.

2.3 Laboratory Examination of Flies

A hand lens and disserting Microscope was used to examine flies which were then identified and sorted out into species using taxonomic keys (Greenberg, 1973) as reported by Nwankwo *et al*., 2019).

2.4 Data Analysis

Percentage occurrence of each flies was calculated, Chi-square was used to determine the relationship between flies and location of sample collection. P-value of less than 0.05 ($P<0.05$) was obtained and considered statistically significant

3.0 RESULTS

The study of relative abundance of Synatropic flies within Makurdi metropolis was considered in this study. A total of 285 species of S. flies were sampled from different locations within Makurdi metropolis; Wadata Market, BSU, Wurukum Market, and Akpehe Market respectively. Identified species were *Musca domestica* (94.0%), *Chrysoma putoria* (5.3%), and *muca sorbens* (0.7 %) respectively as indicated in Table 1 below.

The prevalence of Synatropic flies across sample locations were also evaluated in this study, result showed that wadata market had the highest prevalence 93(32.6%) followed by wurukum market 77 (24.9%) and BSU 44 (15.4%) respectively (Table 2)

Distribution of S. flies species based on sample locations was also considered in this study. The result showed that *Musca domestica* had the highest prevalence in both Locations given a total of 268(94.0), followed by chrysoma putoria 15(4.6%) while musca sorbeans 2 (0.7%) had the least prevalence. Statistically, the result showed insignificance relationship between species and sample location (P=0.077)

Table1: Species Occurrence of Synatrophic Flies Sampled

Species	Frequency	Prevalence (%)
Musca domestica	268	94.0
Chrysoma putoria	15	5.3
Musca sorbens	2	0.7
Total	285	100

$\chi 2=165.860$, df=2, P=0.000

Table 2: Prevalence of Synatropic flies across Sample Locations

Locations	Frequency	Prevalence (%)
Wadata market	93	32.6
Bsu	44	15.4
Wurukum market	77	27.9
Akpehe market	71	24.9
Total	285	100

$\chi 2=6.842$, df=3, P=0.077

Table 3: Distribution of S. flies Species across Sample Locations

Location	Chysoma putoria (%)	Musca domestica (%)	*Musca sorbens* (%)	Total (%)
Wadata	1(1.1)	91(97.8)	1(1)	93(32.6)
Wurukum	3(3.9)	73(94.8)	1(1.3)	77(15.4)
Bsu	6(13.6)	38(86.3)	0(0.0)	44(27.9)

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Akpehe	5(7.0)	66(92.9)	0(0.0)	71(24.9)
Total	15(4.6)	268(94.0)	2(0.7)	285(100)

$\chi 2=6.842$, df=3, P=0.077

4.0 DISCUSSION AND CONCLUSION

4.1 Discussion

Relative abundance of Synatropic flies within Makurdi metropolis was considered in this research and a total of 285 species of S. flies were sampled from different locations within Makurdi metropolis; wadata market, BSU, Wurukum market, and Akpehe market respectively. Identified species were *Musca domestica* with it prevalence of (94.0%), *Chrysoma putoria* 15(5.3%), and *muca sorbens* (0.7 %) respectively. This high level of prevalence is in agreement with the research carried out by Eke *et al*., (2016) to investigate parasite and pathogens associated with synanthropic flies in Bosso, Chanchaga, and Maikunkele in Minna from 4 sampling sites, abattoir, dump sites, open fields and kitchens. A total of 682 synanthropic flies were sampled and 6 different species identified. Flies identified were *Musca domestica* 252 (36.95%), *Musca sorbens* 32(4.92%), *Fannia cannicularis* 137 (20.09%), *Sarcophaga sp* 164 (24.05%) while *Phormia regina* and *Stomoxys calcitransare* 24 (3.52%) and 75 (10.10%) respectively. This slight level of prevalence between this research and that of Eke *et al*., (2016) may be due to the different sample locations and method of sample collection in which both research was carried out.

Distribution of S. flies species based on sample locations was also considered. The result showed that *Musca domestica* had the highest prevalence in both Locations given a total of 268(94.0 %), followed by chrysoma putoria 15(4.6%) while musca sorbeans 2(0.7%) had the least prevalence. This result is almost the same with the findings of Eke *et al*., (2016), who reported in their research that, in all the locations sampled, *Musca domestica* has the highest population 252 (36.95%), and *Phormia regina* 24 (3.52%) the least.

This research is also in agreement with the findings of (Nmorsi *et al*., 2006), who carried out a research between December 2004 and June 2005 in Ekpoma, Edo State Nigeria on detection of some gastrointestinal parasites from four synanthropic flies. Two hundred and ninety-three (293) synanthropic flies were captured by a sweep net method over the surfaces where flies visited. The abundance of synanthropic flies in 4 different locations namely abattoir, market shops, pit latrines, and house environment (kitchen) were presented. Of these sites, the highest fly abundance of 135 was recorded in abattoir while the least (37) occurred in the house environment (kitchen). Of the 4 types of flies collected, *M. domestica* dominated and accounted for 221 (75.4%) of the local fly population and *F. scalaris* 12 (4.1%) had the least abundance rate. The differences in the prevalence distribution between this research and that of (Nmorsi *et al*., 2006), may be due to the fact that they carried out their research on some gastrointestinal parasites from four synanthropic flies while this study focused on the distribution of flies within household.

However, this research documented the prevalence of Synatropic flies across sample locations, result showed that wadata market had the highest prevalence 93(32.6%) followed by wurukum market 77 (24.9%), and BSU 44 (15.4%) respectively. This is entirely different from the research carried out by Ekanem, and Usua, (2013), who reported non-biting fly surveys in urban, rural, and forested areas of Akwa Ibom State, Nigeria, using rotten meat, fish fruits, and human faeces, for collection yielded 4290 and 2474 flies from 9 families in the wet and dry seasons, respectively *albiceps* ($F=10.2+++$; $p < 0.05$) for rotten meat, and *Poecilosomella angulata* ($F+9.6+++$; $p < 0.05$), for human faeces. *C. albiceps* formerly rare in the area was the most abundant species collected at 38.8% and 44.8% specimens in wet and dry seasons, respectively while this research recorded *M. domestica;* 268 (94.0 %) as the most dominated species across sampled locations. It may also be due to the fact that they used rotten meat, fish fruits, and human faeces as bait for collections while this research used traps as means of sample collections and stale fish and meat as bait.

There are at least more than 150,000 species of flies found in the world, while synanthropic flies are probably belong to the common group of fly species that are widely spread and infest a home and business. More than just annoying and irritating insects which you commonly witness landing on your favourite foods and kitchen utensils at home; houseflies and other common synanthropic flies can act as indicators of the dangerous bacteria present in the business environment.

4.2 Conclusion

This study illustrates the diversity of synanthropic flies collected in various human localities within Makurdi local government area of Benue State. Three species (*Musca domestica*, *Chrysoma putoria*, and *muca sorbens*) were identified as the most relative abundance of synanthropic flies within Makurdi metropolis. Houseflies were the most common fly pest around the home and business property, houseflies (*Musca domestica*) were also noticeable for spreading bacterial diseases and infections to humans just as terrible as rats and cockroaches does.

REFERENCES

1. Banjo, A. D., Lawal, O.A. and Adeduji, O.O. (2015). Bacteria and fungi isolated from house fly (*Musca domestica)* larvae. *African Journal of Biotechnology* 4: 780 -784.
2. Chaiwong, T., Srivoramas, T., Sukontason, K., Sanford, R.M., Moophayak, K., and Sukontason, L.K. (2012).Survey of the synanthropic flies associated with human habitations in Ubon Ratchathani province of Northeast Thailand. *Journal of Parasitology Research* (10)1155.
3. Eke, S. S., Idris, A. R, Omalu, I. C. J., Otuu, C. A., Ibeh, E.O. Ubanwa, E.D., Luka, J. and Paul, S. (2016). Relative Abundance of Synanthropic Flies with Asoociated Parasites and Pathogens in Minna Metropolice, Niger State. *Nigerian Journal of Parasitology*. 43-45.

*Corresponding Author: **Shima. N Judith**

4. El-Sherbini, G.T. and El-Sherbini, E.T. (2011).The role of cockroaches and flies in mechanical transmission of medical important parasites. *Journal of Entomology and Nematology* 3(7) 98-104
5. Ekanem S.M, Idiong M.O and Esua E.J (2013) Synanthropic indices and baits preferences of common non–biting flies of Akwa Ibom State, *Nigeria*. *International journal of biodiversity and conversion*, Vol. 5(4) PP. 192-197
6. Hilakaan E.l and Ogwuche J.A (2014) Wood fuel business as a source of livelihood in Makurdi Local Government Area, Central Nigeria. Donnish Journal of Ecology and Natural Environment, Vol 2 (1) PP 006-011.
7. Gabre, R. M. and AbouZied, E. M., (2003).Sarcosaprophagous flies in Suez province, Egypt II-Synanthropic, and abundance degrees," *Bulletin of the Entomological S ociety of Egypt*, 80: 125–132.
8. XXGraczyk, T. K., Cranfield, M.R., Fayer, R. and Bixler,H. (2005). House flies (*Musca domestica*) as transport hosts of *Cryptosporidium parvum. American Journal of Tropical Medicine and Hygiene.* 61:500 –504.
9. Mian N. and Jacal K. L. (2002). Behavioral responses of *Chrysomya megacephala* to natural products," *Journal of Parasitology Research.*102: 419–429.
10. Nmorsi, K. M., Khantawa B., Piangjai S., Rongsiyam Y., Sukontason K. L., Sukontason K. (2016). Comparison between *Musca dometica* and *Chrysomya megacephala* as carriers of bacteria in northern Thailand. *Southeast Asia Journal of Tropical Medicine*. 5:43-47.
11. Nmorsi, O. P. G. Ukwandu, N. C. D. and Agbozele, G. E. (2006). "Detection of some gastrointestinal parasites from four synanthropic flies in Ekpoma, Nigeria," *Journal of Vector-Borne Diseases*. vol. 43, no. 3, pp. 136–139.
12. Nwankwo E.O, Ekemezie, C. L, Adeyemo, S. (2019). Evaluation of microbial flora of the external surface of housefly (*Musca domestica*) in Umuahia Metropolis, Abia State, Southeast Nigeria. Calabar *Journal of Health Science*; 3(1):9-15.
13. Olsen, A. R. (2014). Regulatory action criteria for filth and other extraneous materials. III. Review of flies and foodborne enteric disease. *Regulatory Toxicology and Pharmacology*. 28: 199 –211.
14. Onu J.C (2018) Urban residential housing and low-income earners: A study of Makurdi metropolis, Benue State Nigeria. *European Scientific Journal*, Vol 8, No.28
15. World Health Organization (2019), African People Free of Neglected Tropical Diseases. ESPEN 2019 Annual Report.

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