

## PRELIMINARY STUDIES ON PARASITES IN FAECAL SAMPLES SCAVENGED FROM OPEN MARKETS IN PARTS OF IJEBU-ODE LOCAL GOVERNMENT AREA, OGUN STATE, SOUTH-WEST NIGERIA

Adekunle, O.N.<sup>1\*</sup>, Mogaji, H. O.<sup>2,3</sup>, Adeleke, M. T.<sup>1</sup>, Adesetan, T. O.<sup>4</sup>, Ogunade, A.<sup>1</sup> and Agbolade, O. M.<sup>1</sup>

<sup>1</sup>Department of Zoology and Environmental Biology, Olabisi Onabanjo University, Ago-Iwoye Ogun State, Nigeria

<sup>2</sup>Department of Animal and Environmental Biology, Federal University Oye-Ekiti, Ekiti State, Nigeria

<sup>3</sup>Instituto of Collective Health, Universidade Federal de Bahia, Brazil

<sup>4</sup>Department of Microbiology, Olabisi Onabanjo University, Ago-Iwoye Ogun State, Nigeria

\*Corresponding author: adekunle.oladunni@oouagoiwoye.edu.ng

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### ABSTRACT

*Parasites are a global health problem that endanger the total well-being of humans and animals. This survey was conducted to assess parasites in faecal samples sourced from two open markets (Olabisi Onabanjo Market and Oke-Aje Market) in Ijebu-Ode, Ijebu-Ode Local Government Area, Ogun State, Southwestern Nigeria. A total of 121 samples were obtained and examined for parasites using the sodium acetate-acetic acid-formalin method. The collected data were entered into an Excel spreadsheet and the prevalence of parasites was calculated. Chi square was used to assess the relationship between the location of markets in the study area and the parasites detected in them, with a significance level set at 0.05. Results revealed that out of 121 faecal samples scavenged, 65(53.7%) were from Oke-Aje market, with faeces from humans 34(28.1%) being the most common. Overall, 74 (61.2%) samples were positive for parasites, with 44 (67.7%) being from Oke-Aje Market. Of the ten (10) parasites detected, Eimeria spp. 20(16.5%) had the highest prevalence with 11(19.6%) isolated from Oke-Aje Market. The least common parasite was Entamoeba histolytica with a prevalence of 1(1.5%). There was no significant relationship between the parasites found in the faecal samples collected and the Market locations ( $p>0.05$ ). In conclusion, traders should endeavor to engage in daily sanitation in or around the environment of their marketplaces as faeces found in their surroundings could be parasite-infected.*

**Keywords:** Faeces, Ijebu-Ode, Markets, Ogun State, Parasites

### INTRODUCTION

Livestock animals both ruminants and non-ruminants serve as sources of protein usually consumed by humans. In most rural and semi-rural environments, livestock are mostly managed using outdoor systems where the

animals are allowed to roam their environments fending for themselves with little or no special provision of supplements (Ogudo *et al.*, 2015).

Improper disposal and poor sanitation of animal and human solid wastes often have a

negative impact on the health of living organisms in the environment (Okolie *et al.*, 2023). Repeated consumption of this protein may endanger the health of humans if intestinal parasites are present in them and ingested when undercooked.

Generally, scavenging freely on any available pasture which includes walking to open market places where foodstuffs, fruits, vegetables and livestock are sold exposes animals to environmental dangers, getting infected with pathogens such as bacteria, parasites or viruses and eventually leading to death. In tackling these diseases in achieving optimal health, the One Health by the World Health Organization has taken a holistic approach to animal, the environment and human interrelationships (Mahmoud *et al.*, 2021). Worldwide, human Intestinal Parasitic Infections (IPIs) have been assessed as a major public health problem for 3.5 billion individuals (Khediri *et al.*, 2017). Their routes of exposure and infection include ingestion of undercooked food, contaminated food or water, faecal-oral transmission and skin absorption. According to Ogalue *et al.* (2018), the prevalence of parasitic infections (PIs) is dependent on geographic and socioeconomic factors, climatic factors, poverty, malnutrition, personal and community hygiene, population density, low immunity, access to good sanitary facilities and safe potable water. Malabsorption, diarrhea, anemia, impaired work capacity, reduced growth rate and cognitive impairment due to PIs contribute to health and social problems among children

and adults in parasitic infected-endemic countries.

Humans living in close proximity with parasite-infected animals are prone to transmission of zoonotic diseases (Mogaji *et al.*, 2021). There has been paucity of information on evaluation of faeces found in open market areas to ascertain the possible role of animals as contributors to parasitic infections and as reservoir hosts for zoonotic parasites in Ijebu-Ode, Ogun State, Nigeria. Furthermore, providing information on PIs associated with faeces defecated in the environment by animals and humans in the markets would assist in providing intervention measures by the sanitation officers towards improving the health conditions and productivity in the study area. The objective of this baseline study was to evaluate parasites associated with faeces scavenged from two open marketplaces in Ijebu-Ode, Ogun State Nigeria.

## **MATERIALS AND METHODS**

### **Study area**

The description of the study area is shown in Figure 1. The study area were two markets in Ijebu-Ode in Ijebu-Ode Local Government Area (ILGA) of Ogun State, South-West Nigeria. Ijebu-Ode, which is the second largest city after Abeokuta in Ogun State, possesses a warm tropical climate. Their major inhabitants popularly known as the Ijebus have a reputation of being entrepreneurs with a shrewd business mindset.

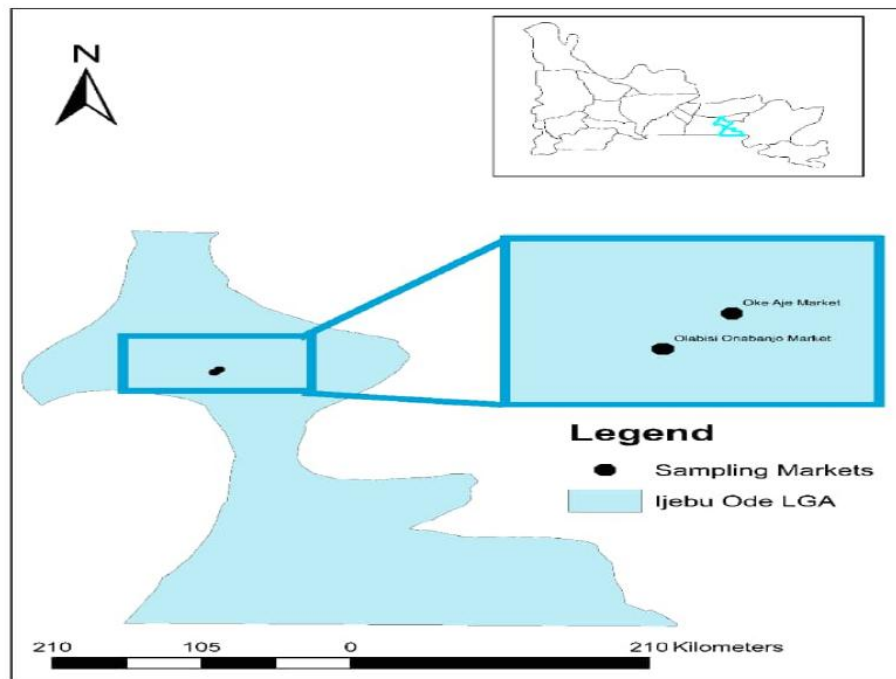


Figure 1: A map showing the selected open markets in Ijebu-Ode Local Government Area, Ogun State

### Sensitization and study design

An introductory letter obtained from the Department of Zoology and Environmental Biology, Olabisi Onabanjo University, Ago-Iwoye, Ogun State, Nigeria was submitted to the Chairman of ILGA for approval of the study. Sensitization was done to the Market Leaders of the two selected markets in the study area and consent was sought. Further, sensitization was done at the Markets with the help of some of the Leaders of the markets and eventually the traders gave their verbal informed consents.

The study, which was a cross-sectional survey, was carried out in Oke-Aje Market and Olabisi Onabanjo Market (OO New Market) in Ijebu-Ode, Ogun State. Once a week for four months, visits were made to each of the markets and various fresh faecal samples were obtained from and around dumpsites in the markets.

### Sample collection

During early morning visits to the markets, fresh faeces were first located in and around marketplaces dumpsites with the aid of hand

gloves and spatula. The samples were transferred into sterile universal bottles, properly labeled and transported to the Zoology and Environmental Biology laboratory in Olabisi Onabanjo University, Ago-Iwoye. The samples collected were processed immediately for identification of parasite eggs, larvae and oocysts.

### Identification of faeces and detection of intestinal parasites in samples

Some of the faeces as shown in Fig 2 - 4 were first classified according to macroscopic appearance, consistency and color in the laboratory into animal or human sources. The faecal examination was conducted for the presence of helminths eggs and /or protozoan oocyst by simple sodium acetate-acetic acid-formalin (SAF) method. As described by Mogaji *et al.* (2021), each sample were homogenized in 10ml of SAF and the solution filtered through a strainer into a test tube. The filtrate was subjected to centrifugation at 2000 revolutions per minute for 60 seconds after which the supernatant was decanted and the tube allowed to stand upright for 120 seconds. Subsequently, 7ml of saline was poured into

the tube followed by 3ml of ether and shaken thoroughly. The tube was returned back into the centrifuge and subjected to 2000 revolutions per minute for 300 seconds. After centrifugation, four layers were observed. With the help of a clean pipette the first three layers were removed until the last layer containing 1ml of the sediment was left. The sediment was thoroughly mixed together and a

drop of the mixture was placed on a clean glass slide using a clean pipette. A cover slip was placed on the mount and placed under a microscope with the objective lens set at 10x to search thoroughly for parasites. The identification of the oocysts/eggs/larvae were done based on their characteristic morphology with the aid of Cheeseborough (1998) and Soulsby (1982).



Fig 2: Feces of a human



Fig 3: Feces of a goat



Fig 4: Feces of a cow

### Statistical analysis

Data collected was entered into micro-soft excel and transferred to Statistical Package for Social Sciences (SPSS) version 25. The prevalence of parasitic infections in each Market was calculated and presented with percentages in Tables. Lastly, chi-square was employed to determine the relationship between parasites identified and the marketplaces ( $p > 0.05$ ).

### RESULTS

Table 1 indicates that out of the 121 specimens collected from the two (2) Markets, more

faecal samples 65(53.7%) were collected from Oke-Aje Market. Human faecal samples 34(28.1%) accounted for the most collected while the least common was pigeon faecal sample with 1(0.8%). There was no significant relationship between the faecal samples collected and markets locations ( $p = 0.550$ ). The distribution of samples collected from the Markets in the study area showed that 74 (61.2%) of the total samples were found to be infected with parasites with the highest being found in Oke-Aje Market 44 (67.7%) (Table 2).

**Table 1:** Distribution of faecal samples in the study area

Study Locations	Faecal samples								p-value
	Cow (%)	Dog (%)	Goat (%)	Human (%)	Pigeon (%)	Poultry (%)	Sheep (%)	Total	
New Market	3(50)	5(33)	9(50)	12(35.3)	1(100)	17(56.7)	9(52.9)	<b>56(46.3)</b>	0.550
Oke-Aje Market	3(50)	10(67)	9(50)	22(64.7)	0(0)	13(43.3)	8(47.1)	<b>65(53.7)</b>	
<b>Total</b>	<b>6(5)</b>	<b>15(12.4)</b>	<b>18(14.9)</b>	<b>34(28.1)</b>	<b>1(0.8)</b>	<b>30(24.8)</b>	<b>17(14)</b>	<b>121(100)</b>	

% - Percentage

**Table 2:** Prevalence of collected faecal samples infected with parasites in the study area

Study Locations	Positive (%)	Negative (%)	Total (%)
OO New Market	30(53.6)	26(46.4)	<b>56 (100)</b>
Oke-Aje Market	44(67.7)	21(32.3)	<b>65 (100)</b>
<b>Total</b>	<b>74(61.2)</b>	<b>47(38.8)</b>	<b>121 (100)</b>

% - Percentage

As shown in Table 3, a total of 10 parasites were identified from both Markets with the highest being *Eimeria* spp. (16.5%) and the lowest being *Entamoeba histolytica* (*E. histolytica*) (1.5%). In both Oke-Aje and OO New Markets, *Eimeria* spp. was more prevalent with 13.8% and 19.6%, respectively. For the least prevalent parasites, *E. histolytica* (1.5%) and *Taenia saginata* (*T. saginata*) (1.5%) were

observed in Oke-Aje Market. The parasite *E. histolytica* detected in Oke-Aje market was not detected in OO New Market; the least common parasites detected in OO New Market were larvae of *Strongyloides papillosus* (*S. papillosus*) (1.8%) and *Strongyloides stercoralis* (*S. stercoralis*)(1.8%). There was no significant relationship between the parasites identified and their market locations ( $p>0.05$ ).

**Table 3:** Prevalence of parasites identified from the faecal samples in the study locations

S/NO	Parasites Identified	Study Locations			p-value
		Oke-Aje (%)	New-Market (%)	Total (%)	
1	<i>Ascaris lumbricoides</i>	6(9.2)	5(8.9)	11(9)	0.295
2	<i>Entamoeba histolytica</i>	1(1.5)	0(0)	1(1.5)	
3	<i>Eimeria</i> spp.	9(13.8)	11(19.6)	20(16.5)	
4	<i>Fasciola hepatica</i>	5(7.7)	3(5.4)	8(6.6)	
5	<i>Giardia</i> spp.	3(4.6)	2(3.6)	5(4.8)	
6	Hookworm spp.	6(9.2)	2(3.6)	8(6.1)	
7	<i>Strongyloides papillosus</i>	3(4.6)	1(1.8)	4(3.3)	
8	<i>Strongyloides stercoralis</i>	8(12.3)	2(3.6)	10(8.3)	
9	<i>Toxocara canis</i>	2(3.1)	2(3.6)	4(3.3)	
10	<i>Taenia saginata</i>	1(1.5)	2(3.6)	3(2.5)	
11	Not infected	21(32.3)	26(46.4)	47(38.8)	
	<b>Total</b>	<b>65(53.7)</b>	<b>56(46.3)</b>	<b>121(100)</b>	

% - Percentage

## DISCUSSION

This is the first study to be scientifically documented in this study area. The presence of faeces in the open marketplaces indicates the present sanitation state of the markets' environment which could be said to be contaminated. Our study further revealed the presence of 10 parasites (protozoans and helminths) associated with faeces scavenged

from the 2 marketplaces. The presence of these parasites which are of human and animal origin in the markets indicates the possibility of zoonotic transmission.

Observations that more faecal samples were collected from the Oke-Aje Market than from OO New market were due to the former's relatively larger size and involvement of more humans in trading activities. *Eimeria* spp. was

being reported as the most prevalent parasite in the faeces collected from the 2 markets possibly indicating heavy presence of domestic birds within the environment. It has been established that animals are allowed to roam freely scavenging for food. Previous studies by Adang and Isah (2016) and Ola-Fadunsinet *et al.* (2019) reported prevalence rates of 42.7% and 18.9% for *Eimeria* spp. in Gombe and Kwara States, respectively in Nigeria. In other parts of the world, Silva *et al.* (2022) reported higher prevalence rate of 59% for *Eimeria* spp. amongst chickens who roam-range in Brazil. This parasite which causes enteric coccidiosis is transmitted through the faecal-oral route and is considered pathogenic because it affects different parts of the intestine depending on the specie. Mixed species infections of *Eimeria* spp. (*Eimeria tenella* and *Eimeria maxima*) and (*Eimeria tenella* and *Eimeria acervulina*) in poultry have been reported by Kaboudi *et al.* (2016) in Tunisia. *Eimeria tenella* is one of the most pathogenic species among the *Eimeria* spp. to that have been recorded in birds. Exposure of birds to different parasites or species of parasites simultaneously increases the chances of pathogenicity ranging from mild to severe. The symptoms of coccidiosis include loss of weight, depression, lethargy, diarrhea, dehydration and eventually the disease may lead to death. Agbolade *et al.* (2019) reported gastrointestinal parasites and *Plasmodium* spp. in local fowls purchased from Markets within Ijebu-Ode, Ogun State, Nigeria.

Other parasites of veterinary importance isolated in our study were *Strongyloides papillosus* and *Toxocara canis*. The presence of these parasites indicates that ruminants and non-ruminants are allowed to roam in the markets' environment. Inegbenosun *et al.* (2023) in Edo State have described the zoonotic potential of these parasites where free range movement of animals was studied.

The high presence of human faecal samples around the marketplaces in the study area is worrisome. *Ascaris lumbricoides*, *Strongyloides stercoralis* and *Entamoeba*

*histolytica* were detected in faeces. According to FMWR *et al.* (2021), approximately 95 million Nigerians have no access to basic sanitation facilities and 48 million people practicing open defecation. There was no significant relationship between parasites isolated from faeces collected around the marketplaces and the market locations. It has been established that parasites are dominant in areas with poor sanitation and no access to water and toilet facilities. Most infective larvae and oocysts of these parasites are environmentally resistant and can remain in the soil for long periods of time. Climatic conditions such as wind and rain can help to transport these parasites from one place to another. Fruits and vegetables offered for sale in the study area may not have been thoroughly washed after coming in contact with the parasite-infected soils, as different parasites have been associated with fruits and vegetables purchased from Markets in parts of Ogun and Ekiti States, Nigeria (Adenusi *et al.*, 2015; Mogaji *et al.*, 2021; Adesetan *et al.*, 2022). Furthermore, the interaction of humans and animals within the market environment such as the ingestion of fruits and vegetables could pose an important risk factor during the transmission of zoonotic diseases. These diseases result in malnutrition, iron deficiency and impaired growth and cognition.

## CONCLUSION

Our study has established that parasite-infected faeces from animals and humans can be found within the environments of our markets. The role that community health workers or sanitation officers play within the communities should be emphasized especially regular visits to Markets to provide enlightenment health talks to market men and women on the importance of the health implications of poor sanitation in the markets should be given. Proper washing of hands, fruits and vegetables should be imbibed. In addition, market men and women as well as their family members should be periodically treated with albendazole. Toilets which can be accessed at night should be built in markets.

Lastly, animal owners who allow their animals to roam freely and their animals should be treated against parasitic infections periodically.

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