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PROFILE OF POTENTIALLY PATHOGENIC INTESTINAL PARASITES AND BACTERIAL AGENTS IN SOLID WASTES IN IBADAN MUNICIPALITY.

BY: *ADEYEBA, O.A & AKINBO, J.A, *Department of Medical Microbiology & Parasitology College of Health Sciences, Ladoke Akintola University of Technology, PMB 4400, Osogbo, Nigeria & Department of Medical Microbiology and Parasitology, University of Ibadan, Ibadan, Nigeria

In order determine the profile of potentially pathogenic enteric parasites and bacterial agents inmunicipal refuse dumps in Ibadan, 5 major market places in the city were randomly selected by balloting method. Refuse sludge were examined parasitologically and bacteriological using the method described. The data analysis was done and test of significance carried out by using the chi square test where applicable. Cases of multiple parasites and bacterial agents were commonly encountered in the sludge refuse samples. The commonly found parasitic agents were of both human and veterinary importance. These included *Ascaris lumbricoides* (9.3 epg), *Entamoeba histolytica* (8,07 cyst per gram); Hookworm/*strongyle* (6.27 epg) and *Ascaris suum* (1.07 epg). Others are *Ascaris vitolorum* (1.09 epg) *Stongyloides papillosu* (0.52 larvae/g) *Schistosoma suis* (0.31 epg) and *Dicrocoelium dendriticum* whilst the most commonly found bacterial agents were *Klebsiella* species, *Escherichia coli*, *Proteus* specie, streptococci and other gram-positive organisms. Climatic conditions affected the distribution of both parasites and bacterial agents in the sludge ($P<0.001$). more intestinal parasites (53.4%) and bacterial agents (27.2%) were encountered at mean air temperature 26.1 ± 0.6^0C, mean relative humidity of $72 \pm 3.5\%$. The degree of contamination by market location varies significantly ($P<0.001$) A high degree of contamination of solid waste dumpsites with bacterial and bacterial and parasitic agents was observed in the present study. As a result of the public importance of the organisms isolated it is opined that well planned waste management and health education programs will go a long way to reduce the potential epidemic risks posed by such sites in Ibadan, Nigeria. it is believed that economic advantage could be taken of the mountainous solid waste dump by establishing fertilizer-processing plant to produce fertilizer for farmers and provide job opportunity for youths in the area.
KEY WORDS: Pathogens, Contamination, Intestinal Parasites, Bacteria, Refuse Dump, Markets, Ibadan, Health Education. BeninCity.

INTRODUCTION

Refuse, soil, animal waste and sewage sludge are common sources of manure, used to fertilize agriculture fields (1,2,3,). Studies have revealed the incidence and distribution of many pathogenic intestinal parasites and bacterial agents from refuse which infect both man and animals (4,5,6,). The most commonly found bacterial agents include gran-negative enteric bacteria like *Pseudomonas species, Salmonella* species, *Klebsiella* species, *Escherichia coli, Aeromonas* species and some gram-positive organisms (4,5,6,7,8).

Similarly intestinal parasites are life in many communities and are of such a major international health concern (9). It has been shown that refuse dumps are significant sources of transmission for intestinal parasitic infection in Kampala, Uganda and Jos, Nigeria (10,11). Whereas many workers have isolated veterinary and medically important parasitic agents from refuse dumps and abattoir in some parts of the world (11,12,13), there is dearth of information on the status of refuse dumps in Southwestern Nigeria. Hence this study is designed to determine the profile of potentially pathogenic enteric bacterial and parasitic agents in refuse dumps in major markets in Ibadan metropolis.

MATERIALS AND METHODS

Study Area: This study was carried out between July 1999 and January 2000 in Ibadan, capital of Oyo State, Nigeria, the most populace black city south of the Sahara Desert with about 3.5 million inhabitants (1991 national census). Being a metropolitan city, there is influx

of people of other nationalities beside the local indigenes for many reasons including socio-economic and political. This deluge of people into the city has resulted in the proliferation of markets in the city to the extent that numerous refuse dumps are common features because of the inability of the responsible authority to cope with the disposal. It is common to see refuse dumps disturbing both vehicular and pedestrian movements in the city. Ibadan experiences both wet and dry seasons. April and October span the rainy season with average rainfall of about 550mm and 1000mm while the dry season cover the period of November and March (Federal office statistics, Lagos, 1998).

Sample Selection: For the purpose of this study 5 major market places were randomly selected (by balloting method) form the list of markets in the metropolis.

Sample Collection: A total of 1610-refuse sludge samples was collected in all the refuse dumps in the study areas. Each of the 5 refuse locations was visited 14 times and the collections were done twice in the day between 7.00hr-8.00hr (mean relative humidity of 82+- 3.0%; mean air temperature of 26.1 +-0.6°C) and 15.00hr – 17.00hr (mean relative humidity of 72 +- 3.5%; mean air temperature of 28.4+-0.5°C) respectively. On each of the first and second visit, 23 samples were taken to make up 322 samples taken from each refuse locations at the end of 7 months period of the study.

About 100g each sample of sludge taken from a depth of 10cms from each refuse site was collected with the aid of sterile wooden spatula into sterile 20 cc screw - capped plastic bottle. This was done in order to ensure uniformity in sampling. Samples from each site were later pooled together to produce a single sample for analysis dumpsite.

Sample Analysis:

a. Parasitology: This was carried out by using the technique described by Kegei (14). 100g refuse sludge as weighed was passed through a coarse sieve of 4mm² pore size to remove stones, grass and other undesirables. The preparation was later transferred quantitatively to 50ml volumetric flask. To each volume of refuse, 2 volumes of 30% sodium hypochlorite fluid were added as disinfectant, vigorously stirred and allowed to stand for 3o minutes. This mixture was further diluted to the 50ml mark and mixed again. Coarse particle was stained out by passing through a coarse mesh clothe into a centrifuge tube and centrifuged at 3000 rpm for 2 minutes. The supernatant was discarded and the deposit re-suspended in magnesium sulphate floatation fluid of specific gravity 1.3, and then centrifuged again at 3000 rpm for another 2 minutes.

The floatation fluid in the centrifuge tube was then filled up to form a positive menicus and a covership was superimposed on it and left to stand for 5 minutes. The coverslip was then lifted with a swift action and placed on a glass and examined microscopically for the presence of cyst and eggs of parasite as described by Lelano, *et. al* (13).

b. Bacteriology: 100g refuse sludge was passed through a coarse sieve of 4mm² pore size to remove stones etc. this was homogenized in 50ml volumetric flask with sterile normal saline. Sample was seconded on agar, Maconkey agar and Decxycholate agar platesand Selenite Froth for the primary isolation of organism as described by Cruickshank, *et al* (15). All cultures were incubated at 37°C overnight in the presence of free oxygen. All isolates were characterized and identified by using the criteria of Cowan and Steel (16). Oxford *Staphylococcus* (NCTC 6571)

and *Escherichia coli* (CTC 10418) were used as control.

Data Analysis

The data analysis was done by using the computer and the chi-square test level of significance where applicable.

RESULT

Parasites encountered in refuse dumps in Ibadan. Table 1 shows the profile of the intestinal parasites isolated from refuse waste dumps in Ibadan metropolis with corresponding probable hosts. These parasites include protozoam cycts. Out of the oocyst and Helminthes eggs of man, dog, sheep pig, cattle and goat of the 18 different species recovered, protozoa cyst were 5, helminthes eggs 12 and flagellate 1. *Ascaris humbricoides* (9.37 epg) is the most frequently encountered parasite, followed by *Entamocha histolytica* (8.07 cysts) Hookworm/Strongyle (6.27 epg while *Schistosma suis* (0.31 epg) was the least encountered.

Prevalence of intestinal parasite in Ibadan municipal refuse dump by market locations is shown in table 2. Result shows multiple parasitic agents in each refuse dump sample. The level of contamination with parasitic agents by refuse dump differ significantly (X^2 = 1391.52, df = 4, P<0.001) of the total 4727 cases of polyparasitism by market locations, Sango, 1263 (26.7%) has the highest prevalence rate of multiple parasitic contamination. This was followed by Oritamerin market dump site 1245 (26.3%), Bodija, 1182 (25.0%), Oje, 599 (12.7%) and Dugbe, 438 (9.3%). Though Sango refuse dump appeared to be the most contaminated of all, this variation, compared to Oritamerin and Badija refuse location was statistically significant (P0.001)

Table 3 shows the prevalence of intestinal parasites encountered in Ibadan refuse dumps at mean air temperature 26.1 +-0.6 and mean relative humidity of 82 +- 3.0%. Results show the profile of intestinal parasite encountered. Data revealed the degree of contamination's in each of the refuse locations of the total (2523) number of polyparasitism at this climatic condition, *A.lumbricoides* 20.2% had the most prevalent rate followed by *E. histolytica* 16.5%, strongyle 15.7% and *S.suis* 0.6% there is a statistical difference in the degree of contamination by refuse location (X^2 = 1781.04, df = 4, P<0.001).

Table 4 shows the prevalence rate of intestinal parasites encountered at mean air temperature 28.4+- 0.5°C and mean relative humidity 72+-3.5% of the 2204 positive cases of polyparasitism, *A lumbricoides* (19.3%) had the highest prevalence rate, followed by *E.histolytica* (17.7% Hookworm (strongyle) 10.4% and *Dicrocelium dendriticum* (0.4%) successively. The variations by refuse dump differ significantly (X^2 = 98.61, df = 4, P<0.001). However, the difference Bodija (27.5%) and Oritamerin (28.7%) was not significant (P>0.001).

The prevalence of the potentially pathogenic bacterial agents isolated from municipal dumps in Ibadan by market locations is shown in Table 5. The result shows a varying degree of multiple bacterial agents by each refuse location; oritamerin, 945 (25.1%) was the most frequently contaminated followed by Bodija, 882 (23.4%); Dugbe 755 (20.1%) and Sango 579 (15.4%). These variation shows a significant statistical difference (X^2 = 2501.99, df = 4, P<0.001). However the difference between Sango 579 (15.4%) and Oje 601 (15.9%) was not significant (P>0.001).

Table 6 shows the prevalence of potentially pathogenic enteric bacterial agents asserted at mean air temperature 26.1 +-0.6 and mean relative humidity 82+- 3.0% of the 2150 multiple bacterial agents isolated at this climatic

condition, *Klebsiella* specie 573 (26.7%) was the most prevalent followed by *E coli* 473 (22.0%) while the lust encountered was *Streptococcus* species 12 (0.6%). There was significant difference in the degree of contamination by marker location (X^2 = 1173, df=4, P<0.001).

The prevalence of potentially pathogenic bacterial agents isolated at mean air temperature 28.4+- 0.5 and mean humidity of 72+-3.5% of the 7612 cases of multiple bacterial contamination at this climatic condition, *E coli* 238 (14.8%) was the highest prevalent followed by *Klebsiella* specie 218 (13.8%) and *Streptococcus* specie 15 (0.9%). The variations in the contamination rate by refuse dump were also significant (X^2 = 834.23 df =4, P<0.001).

Table 1: PARASITIC OVA, CYSTS AND LARVAE FOUND IN REFUSE DUMPS IN IBADAN.

Parasite	Possible host	Total numbers of cyst/egg/100g
Entamoeba histolytica	man	807
Entamoeba coli	man	204
Blantidium coli	man	34
Giardia lamblia	man, dog, cat	190
Trichhomonas hominis	man	506
Cocida(oocyst)	sheep	120
Ascaris himbricoides	*man, pig*	937
Ascaris suum	man, pig cattle	107
Ascaris vitulorum	cattle	109
Hookworn	man	627
Trichuris trichiura	man	160
Trichuris ovis	sheep, goat	333
Strongyloides stercorlis	man	66
Trichostrongylus	sheep	52
Fasciola hepatica	man, sheep, goat	202
Teania specie	man,	81
Dicrocoehum dendriticum	sheep, goat	48
Schistosoma suis	pig	31

Table 2: PREVALENCE OF INTESTINAL PARASITES IN MUNICIPAL REFUSE DUMP IN IBADAN BY MARKETS LOCATIONS.

PERCENTAGE OF POSITIVE CASES.

Refuse location	Bodij	Sango	Orita-merin	Dugbe	Oje
No. of samples	32.2	32.2	32.2	32.2	32.2
Entamoeba Histolytica (%)	10.7	26.9	10.1	24.2	24.2
Entamoeba coli (%)	1.4	7.1	5.8	4.3	1.0
Balan tidiumcoli (%)	1.6	1.2	0	0	0
Gardia lamblia (%)	2.0	3.9	4.3	8.6	4.3
Trichomonas hominis (%)	6.2	11.2	14.41	13.9	8.3
Cococidia Ooyst (%)	9.1	1.3	0.5	0	0
Ascaris lumbricoides (%)	21.8	17.0	18.4	30.3	17.0
Ascaris Suum (%)	4.8	0.7	3.3	0	0
Ascaris vitulo (%)	1.2	0	4.3	0	6.8
Hookworm (%)	6.6	16.8	14.3	17.1	14.6
Trichuris triciura (%)	2.1	1.9	3.1	0	12.1
Trichuris ovis (%)	6.2	2.2	0.6	0	0
Strongyloidies stercoralis (%)	5.6	9.4	7.1	2.7	8.0
Trichostrongyl (%)	3.7	0	1.8	0	0
Strongyloides papillosu (%)	4.4	0	0	0	0
Fasciola hepatioa (%)	7.5	0	8.5	1.5	0
Taenia specie (%)	0	0	3.2	4.7	3.3
Dirocoelium dendriticum (%)	3.1	0	0.9	0	0
Schistosomasuis (%)	1.9	0.7	0	0	0
Total with polyparastism per dump site	1182	1263	1245	438	599
Degree of contamination #	25.0	26.7	26.3	9.3	12.7

Table 3: PREVALENCE OF INTESTINAL PARASITE IN IBADAN MUNICIPAL REFUSE DUMPS AT MEAN AIR TEMPERATURE OF 26.1 ± 0.6°C AND MEAN RELATIVE HUMIDITY OF 82 ± 3.0%.

PERCENTAGE OF POSITIVE CASES.

Refuse location	*Bodij*	*Sango*	*Orita-merin*	*Dugbe*	*Oje*
No. of samples	*161*	*161*	*161*	*161*	*161*
Entamoeba Histolytica (%)	*7.4*	*38.6*	*4.2*	*12.5*	*12.0*
Entamoeba coli (%)	*1.6*	*3.0*	*4.2*	*5.9*	*0.3*
Balan tidiumcoli (%)	*1.4*	*2.2*	*0*	*0*	*0*
Gardia lamblia (%)	*3.3*	*5.0*	*5.2*	*12.5*	*7.1*
Trichomonas hominis (%)	*4.7*	*12.8*	*12.1*	*12.8*	*3.3*
Cococidia Oogst (%)	*8.7*	*0*	*0*	*0.7*	*0*
Ascaris lumbricoides (%)	*22.6*	*13.1*	*21.4*	*26.4*	*24.0*
Ascaris Suum (%)	*3.6*	*0.4*	*0*	*0*	*0*
Ascaris vitulo (%)	*0.7*	*0*	*5.2*	*0*	*5.5*
Hookworm (%)	*8.2*	*20.8*	*13.9*	*18.3*	*19.1*
Trichuris tricura (%)	*1.0*	*0.9*	*5.1*	*0*	*19.1*
Trichuris ovis (%)	*7.6*	*1.4*	*0*	*0.*	*0*
Strongyloidies stercoralis (%)	*2.4*	*1.1*	*11.3*	*4.4*	*6.8*
Trichostrongyl (%)	*5.0*	*0*	*1.3*	*0*	*0*
Strongyloides papillosu (%)	*6.4*	*0*	*0*	*0*	*0*
Fasciola hepatica (%)	*8.2*	*0*	*9.6*	*1.5*	*0*
Taenia specie (%)	*0*	*0*	*4.4*	*5.1*	*1.9*
Dirocoelium dendriticum (%)	*4.7*	*0*	*2.0*	*0*	*0*
Schistosomasuis (%)	*2.3*	*0.6*	*0*	*0*	*0*
Total Parasitism in refuse sample	*576*	*696*	*62*	*273*	*366*

Table 4: PREVALENCE OF INTESTINAL PARASITES IN IBADAN MUNICIPAL REFUSE DUMPS AT MEAN AIR TEMPERATURE OF 28.4 ± 0.5°C AND MEAN RELATIVE HUMIDITY OF 72 ± 3.5%.

PERCENTAGE POSITIVITY

Refuse location	Bodije	Sango	Orita-merin	Dugbe	Oje
No. of samples	161	161	161	161	161
Entamoeba Histolytica (%)	13.5	12.5	15.8	21.8	43.3
Entamoeba coli (%)	1.3	12.2	7.3	1.8	2.1
Balan tidiumcoli (%)	1.8	0	0	0	0
Gardia lamblia (%)	0.8	2.5	3.3	2.4	
Trichomonas hominis (%)	7.8	9.3	16.6	15.8	16.3
Cococtidia Oayst (%)	9.4	2.8	0	0	
Ascaris lumbricoides (%)	21.1	219	15.5	37.0	6.0
Ascaris Suum (%)	5.9	0	3.5	0	9.0
Ascaris vitulo (%)	1.2	0	4.3	0	6.8
Hookworm (%)	5.3	10.9	14.7	15.2	7.7
Trichuris trichura (%)	3.1	3.2	1.1	0	
Trichuris ovis (%)	4.1	3.2	1.1	0	0
Strongyloidies stercoralis (%)	8.6	11.9	3.0	0	9.9
Trichostrongyl (%)	2.5	0	2.2	0	0
Strongyloides papillosu (%)	2.5	0	0	0	0
Fasciola hepatica (%)	6.5	0	7.7	1.8	0
Taenia specie (%)	0	0	2.1	4.2	5.6
Dirocoelium dendriticum (%)	1.5	0	0	0	0
Schistosomasuis (%)	1.5	0.9	0	0	0
Total Parasitism in refuse sample	606	567	633	165	233
Degree of contamination	27.5%	25.7%	28.7%	7.5%	10.6%

* Total depict polyparasitism in refuse sample
\# Percentage contamination per refuse dump
( ) Percentage contamination.

Table 5: INCIDENCE OF POTENTIALLY PATHOGENIC BACTERIA IN MUNICIPAL REFUSE DUMPS IN IBADAN BY MARKET LOCATIONS

PERCENT POSITIVITY

Refuse locations	*No. of sample examined*	*Staphylococcus aureus (%)*	*Staphylococcus albas (%)*	*Staphylococcus Specie (%)*	*Yeast Cells (%)*	*Gram Positive bacilli (%)*	*Escherichia coli (%)*	*Klebstella specie (%)*	*Proteus specie (%)*	*Pseudomonas specie (%)*	*Salmonella specie (%)*	*Total **	*Degree of contamination*
Bodija	322	(5.6)	(10.3)	(2.6)	(5.2)	(11.5)	(17.9)	(20.6)	(6.0)	(16.9)	(4.6)	882	23.4%
Sango	322	(3.2)	(2.7)	(0.6)	(9.7)	(15.0)	(15.8)	(23.4)	(7.1)	(16.9)	(5.1)	579	15.4%
Orita merin	322	(7.1)	(3.8)	0	(3.8)	(9.3)	(19.4)	(25.2)	(10.4)	(19.7)	(1.2)	945	25.1%
Dugbe	322	(8.2)	(6.1)	0	(3.8)	(14.8)	(20.7)	(16.1)	(11.1)	(9.9)	(9.0)	755	20.1%
Oje	322	(6.4)	(4.2)	0	(1.9)	(19.4)	(20.9)	(18.6)	(11.8)	(15.8)	(0.6)	601	15.9%

* Total depict polyparasitism in refuse sample

\# Percentage contamination per refuse dump

Table 6: PREVALENCE OF POTENTIALLY PATHOGENIC BACTERIA IN REFUSE DUMPS IN IBADAN AT MEAN AIR TEMPERATURE OF 26.1 ± 0.6°C AND MEAN RELATIVE HUMIDITY OF 82 ± 3.0%.

PERCENT POSITIVITY

Refuse locations	*No. of sample examined*	*Staphylococcus aureus (%)*	*Staphylococcus albas (%)*	*Staphylococcus Specie (%)*	*Yeast Cells (%)*	*Gram Positive bacilli (%)*	*Escherichia coli (%)*	*Klebstella specie (%)*	*Proteus specie (%)*	*Pseudomonas specie (%)*	*Salmonella specie (%)*	*Total **	*Degree of contamination*
Bodija	*161*	*(4.1)*	*(2.3)*	*(2.3)*	*(6.4)*	*(10.9)*	*(22.2)*	*(17.3)*	*(2.8)*	*(12.9)*	*(4.9)*	*532*	*24.7%*
Sango	*161*	*(5.1)*	*(1.2)*	*0*	*(10.9)*	*(16.0)*	*(15.4)*	*(27.8)*	*(3.3)*	*(9.7)*	*(4.5)*	*331*	*15.4%*
Orita-merin	*161*	*(4.8)*	*(1.3)*	*0*	*(2.6)*	*(7.9)*	*(1.7)*	*(31.8)*	*(10.3)*	*(18.6)*	*(1.1)*	*544*	*25.3%*
Dugbe	*161*	*(5.4)*	*(1.0)*	*0*	*(6.2)*	*(16.7)*	*(25.1)*	*(23.8)*	*(17.2)*	*(3.8)*	*(0.8)*	*390*	*18.1%*
Oje	*161*	*(5.9)*	*(2.5)*	*0*	*(0.8)*	*(21.5)*	*(24.9)*	*(19.8)*	*(15.3)*	*(8.5)*	*(0.6)*	*353*	*16.4%*

* Total depict polyparasitism in refuse sample

\# Percentage contamination per refuse dump

Table 7: PREVALENCE OF POTENTIALLY PATHOGENIC BACTERIA IN REFUSE DUMPS IN IBADAN AT MEAN AIR TEMPERATURE OF 28.4 ± 0.5°C AND MEAN RELATIVE HUMIDITY OF 72 ± 3.5%.

PERCENT POSITIVITY

Refuse locations	*No. of sample examined*	*Staphylococcus aureus (%)*	*Staphylococcus albas (%)*	*Staphylococcus Specie (%)*	*Yeast Cells (%)*	*Gram Positive bacilli (%)*	*Escherichia coli (%)*	*Klebstella specie (%)*	*Proteus specie (%)*	*Pseudomonas specie (%)*	*Salmonella specie (%)*	*Total **	*Degree of contamination*
Bodija	*161*	*(7.7)*	*(17.1)*	*(3.1)*	*(3.4)*	*(12.3)*	*(10)*	*(10.6)*	*(10.9)*	*(20.6)*	*(4.3)*	*350*	*21.7%*
Sango	*161*	*(0.8)*	*(4.8)*	*(1.6)*	*0*	*(13.7)*	*(16.5)*	*(17.7)*	*(12.1)*	*(26.6)*	*(6.0)*	*248*	*15.4%*
Orita-merin	*161*	*(11.2)*	*(11.5)*	*0*	*(5.5)*	*(11.2)*	*(16.2)*	*(16.4)*	*(10.5)*	*(21.4)*	*(1.2)*	*401*	*24.8%*
Dugbe	*161*	*(11.2)*	*(11.5)*	*0*	*(1.4)*	*(12.7)*	*(16.2)*	*(7.9)*	*(4.7)*	*(16.4)*	*(17.8)*	*365*	*22.6%*
Oje	*161*	*(7.3)*	*(6.5)*	*0*	*(3.6)*	*(16.5)*	*(15.3)*	*(16.9)*	*(6.9)*	*(17.8)*	*0*	*365*	*22.6%*

* Total depict polyparasitism in refuse sample

\# Percentage contamination per refuse dump

DISCUSSION

This study has shown that there is a high degree of refuse contamination with pathogenic human animal intestinal parasites and bacterial agents in Ibadan municipality. The commonly found intestinal parasites include *A lumbricoides, E histolytica,* hookworm (strongyle). While the least encountered was *Schistosoma suis.* The cysts, oocyst and helminthes eggs recovered form the refuse dump sample were essentially those that were shed in the faeces of human and animal which became dispersed indiscriminately to refuse dumps. Other potential sources include litters from poultry farms, piggeries, sheep, goat market in the study area and waste from abattoir houses. These sources of cysts and eggs in refuse dumps are similar to those previously reported elsewhere in Nigeria (1.17) and in other part of the world (18,19). The report of isolation of intestinal parasites of veterinary importance such as *A suum., a. vitulorum and Sreonfyloides papillosu* in Ibadan refuse dumps accords well with the report of Burger (12) that intestinal parasites of veterinary importance are capable of being transmitted to the public through abattoir want which were indiscriminately deposited in the refuse dump.

The isolation of these parasitic agents from municipal refuse is highly as the parasites are capable of causing outbreak of water or food borne amoebiasis, giardiasis or balantidiasis through the contaminative route (11). And this is in consonance with reports of outbreak of giardiasis from cyst and oocyst in municipal sludge (18,19). These reports corroborate the fact that other parasitic agents isolated in this study are potentital courses of infection to the population in Ibadan.

This study has shown that there were cases of multiple parasitic contamination in each refuse dump sample. The prevalence of the parasites by market locations has shown a statistically significant difference (X^2= 1391.52,df=4, P<0.001). This meant that risk of contacting disease in these areas is relatively the same. The level of pollution in these market places is sound to be higher than the rest as residential buildings in the area have no toiled nor waste disposal facilities often use the market as dumping ground for their excrement and other wastes.

It has been shown in this study that climatic .condition has significant impact on the occurrence rate of parasitic agents in refuse dump in Ibadan. More intestinal prarsites (53.4%) were isolated at mean air temperature 26.1+- 0.6^{2}C mean relative humidity of 8.2+-3.0% than 46.6% isolated at mean air temperature 28.4+-0.5 and mean relative humidity 72+-3.5%. This report accords well with other reports (20,21,22) that the survival of intestinal parasites is dependent on favourable degree of temperature, moisture, humidity, desiccation, and biological activities.

The potentially pathogenic bacterial agents recorded in this study are essentially gram negative enteric bacteria and few other gram positive. These organisms which were also reported earlier on (5,6,7) include *Klebsiella* specis, *Escherichia coli, proteus* species, *P seudomonas* specie, *Salmonella* species *Staphylococcus aureus, Staphylococcus albus* and yeast cells. According to Ashiru and Osoba (23) a number of human diseases have been attributed to have originated from community acquired bacterial agents, especially where environmental conditions such as poor sanitation, heavy flies density and indiscriminate disposal of human ad animal waste is prevalent. It is important to not that the heap of refuse dumps in the study are located at a no far distance from the

market centre where arrays of exposed food items are displayed. Earlier on, Adeyeba and Okpala (24) have reported that common filth houseflies are active mechanical transmitters of potentially pathogenic parasites and bacterial agents in Ibadan markets.

The prevalence of the potentially pathogenic bacterial agents in refuse dumps in Ibadan market further confirms the report of Adeyeba and Okpala (24) on enunciated. This result shows a varying degree of multiple bacterial contamination. Though the variation was generally statistically significant (X^2 = 251-50, df=4, P<0.001) in the study area the degree of bacterial contamination in Sang market (15.4%) and Oje market (15.9%) was not significantly different.

Prevalence of these multiple bacterial agents varies with change in climatic condition. It has been shown that at mean air temperature 26.1+-0.5°C and mean relative humidity of 82+- 30%, more bacterial agents were isolated in the refuse than at mean air temperature 28.4+-0.5°C, mean relative humidity of 72+-3.5%.

The difference in the prevalence by climatic condition was statistically significant (X^2 = 834.23 df =4, P<0.001). This reinforces the fact that the survival of bacterial agent depends on conducive atmospheric conditions among things as opined by Adeyeba and Okpala (24).

RECOMMENDATION AND CONCLUSION

This study has shown that there is a high degree of refuse contamination with pathogenic intestinal parasites and bacterial agent in Ibadan market places. These reservoirs of potential infectious agents portends a great danger public health as most food stuffs sold in the markets are often left exposed to house flies which mechanical carrier of pathogenic in the area (24). It is our considered opinion that the waste dumps in Ibadan could be turned to a useful economic resource as against the present status of "nursery" of pathogens. Therefore the mountainous refuse dumps could be processed into organic fertilizer for use by the farming community of the state to boost the economy of the area. the fertilizer plant would also provide job opportunity for the youth as part of the poverty alleviation programme of government. Besides, the roads would be cleared of the mountainous rubbish to ensure vehicular and pedestrian movement. It is also recommended that the Health Education unit of the Local government should be adequately funded in order to perform its traditional rôle/duty of informing, educating and communicating. This will ensure that the knowledge, attitude and beliefs of the selling and buying population are changed positively to promote good public health.

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