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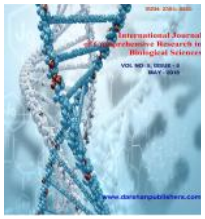

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Research Article

ENVIRONMENTAL ASSESSMENT IN SOME SCHOOLS OF FLOOD AFFECTED AREAS OF OGBARU LOCAL GOVERNMENT ANAMBRA STATE, NIGERIA.

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Abstract

An epidemiological study was carried out on school children in some flood affected areas of Ogbaru local government Anambra state Nigeria to assess their environment after the 2011/2012 flood. Four hundred and eighty primary school children were examined. Formol acetate concentration method was used to analyse the stool and soil samples for intestinal parasites and geohelminths respectively. Water samples were screened for indicator organisms using the membrane filtration technique while air samples were analysed using the microbial air sampler and cultured on maltose dextrose agar. Geohelminths isolated from the soil in the schools showed a prevalence of 56 (46.67%) and they include *Ascaris lumbricoides* (60.71%), hookworm (14.29%), *Taenia* (12.50%) and *Trichuris trichiura* (12.50%) with the backyard showing the highest rate of contamination with helminth eggs. Ten (10) fungal species belonging to 7 genera were isolated from the various classrooms with a total frequency of 171 and they include *Aspergillus* species (*A. niger* 17.94%, *A. flavus* 2.92%, *A. fumigatus* 2.34%, *A. tamar* 14.04%), *Fusarium* sp (19.30%), *Culvularia* sp (12.28%), *Rhizopus* sp (12.87%), *Cladosporium* sp (7.02%), *Penicillium* (7.02%) sp and *Phialomonium* sp (4.68%). The total mean counts of the indicator organisms from boreholes, reservoir, manual pumps and streams were unacceptable for drinking water. These findings suggest that this area has some major public health challenges therefore the need for adequate measures to remedy the situation and avoid epidemic.

Keywords: epidemiological study, school children, stool and soil samples, concentration method

Introduction

Floods are the most common natural disaster in both developed and developing countries, and they are occasionally of devastating impact [1]. There is potential for increased faecal-oral transmission of disease, especially in areas where the population does not have access to clean water and sanitation. Such diseases include, nonspecific diarrhoea[2], poliomyelitis, rotavirus, typhoid and paratyphoid, cholera, dysentery [3].

The quality of water varies with its purpose, thus the quality required for domestic, industrial and irrigation purposes vary widely [4]. Surface and ground water pollution are usually from

agricultural industrial and domestic origin. Water may be contaminated with protozoal agents of diarrhea such as *Giardia lamblia, Entamoeba histolytica/dispar* [5], bacterial agents such as *Eschericia coli, shigella spp*, *Vibrio cholera* [6] and other forms of microorganisms.

With the recent flooding, the people of Ogbaru local government area of Anambra state are faced with so many challenges such as poor sanitary system; overflowing of toilets, poor drainage etc. These have affected their lives negatively.

Aims

This study is designated to assess the environment affected by flood area among primary school children in Ogbaru LGA, ascertain the potability of their drinking water and determine the prevalence of pathogenic fungi in their classrooms.

Materials and Methods

Study area

The study was done in Ogbaru Local Government Area in Anambra State south-eastern Nigeria.

Sampling technique

Pupils were selected randomly after volunteering based on age and sex. Age range of 6-17 from both sex consisted the number of children from primary 1-6.

Ethical considerations

Approval was sort from Anambra State Universal Basic Education Board (ASUBEB), The consent of Ogbaru Local Government Educational Secretary, school authorities, and ethical clearance from the Faculty of Health Science and Technology, Nnamdi Azikiwe University, Nnewi campus was also obtained. Verbal and written informed consent was sought from all eligible individuals and from their parents.

The investigation was carried out at the Department of Medical Laboratory Science, Nnamdi Azikiwe University Nnewi Campus.

Soil sample examination

Five (5) grams of each soil sample was placed in tube containing 4ml of 10% formol water. This was mixed for one minute. The suspension was then strained through a sieve placed over funnel to remove coarse sand. 4ml of ethyl acetate was added to the filtrate in a centrifuge tube and the mixture centrifuged at 2,300 rpm for 3 minutes. The supernatant was decanted and the sediment placed on a clean slide, covered with a cover slip and examined microscopically using 10x and 40x objectives. The ova/larvae of parasites were identified with reference to Atlas of Parasitology [7].

Culture media; CHROMagar liquid ECC, KF *Streptococcus* Agar and Reinforced *Clostridium* agar were prepared according to manufacturers' instruction.

Culture

KF *Streptococcus* agar was prepared based on formulation described by Kennor *et al.* [8]. The filtered sample on the membrane filter was transferred directly on the agar medium avoiding the formation of bubbles. The plates were inverted and incubated at 37^0c for 48hours. After 48hours the red and pink colonies were counted and reported as faecal *streptococci* per 100ml

Culture

To count the spores of sulphite-reducing *Clostridia*, the volume (100ml) of the water Sample was heated to 60 ± 2 °C and the whole volume maintained at this temperature for 15 minutes. Cooked meat medium were prepared according to manufactures instruction and the samples were inoculated into the medium for enrichment and incubated for 24hours at 37^0c. Prior to filtration, reinforced clostridium differential agar was prepared and allowed to

solidify. The samples were filtered and the filter membrane placed on the Petri dishes containing the medium and incubated at 37 °C in an anaerobic jar containing gas-pak for 24 hours [9].

After incubation, all black or grey colonies were counted an expressed as number of colonies per 100 ml.

The colonies were sub-cultured on blood agar and incubated anaerobically for 24 hours according to method described by Chessbrough [10. The colonies showed marked haemolysis on blood agar after 24hours.

Gram stain as described by Chessbrough [10] was carried out to identify the organism. Gram-positive organisms-purple, Gram-negative organisms-pink. Organism was large gram positive rods

Air sample processing and analysis

After collection of air samples, the media plates were incubated at room temperature (25^0C) for 3 days and observed macroscopically for morphological features of the fungi growth. Physicalcounts of the fungal colonies were made.

Statistical analysis

The data collected were analysed using the statistical package for the social sciences-SPSS software version 16.0, ANOVA, t- test and Frequency distribution. Level of significance was set at 95% confidence interval, $p<0.05$ was considered statistically significant.

Results

Table 4.4: Prevalence of geohelminths from soil in different school compound

SCHOOL LOCATION	NO. OF SOILSAMPLE EXAMINED	No infested (%)	*A lumbricoidies*	*T tricuria*	Hookworm	*Taenia*
ODEKPE,	16	11(68.75)	5(45.45)	4(36.36)	2(18.18)	0
OHITA	8	6(75.00)	4(66.67)	1(16.67)	0	1(16.67)
OSSOMALA	16	10(62.5)	5(50.0)	2(20.00)	1(10.00)	2(20.00)
AKILIOZIZO	16	7(43.75)	4(57.14)	0	3(42.86)	0
UMUNAKWO	8	3(37.50)	2(66.67)	0	1(33.3)	0
OGBAKUBA	16	4(25.00)	4(100)	0	0	0
OKPOKO	16	9(56.25)	7(77.78)	0	0	2(22.22)
OCHUCHE	8	3(37.50)	1(33.33)	0	0	2(66.67)
AMIYI	16	3(18.75)	2(66.67)	0	1(33.33)	0
TOTAL	**120**	**56(46.67)**	**34(60.71)**	**7(12.50)**	**8(14.29)**	**7(12.50)**

TABLE 4.9: FREQUENCY DISTRIBUTION OF INDOOR FUNGI FROM DIFFERENT SCHOOL CLASSROOMS VISITED IN OGBARU LGA.

SCHOOL LOCATION	NO OF SITES EXAMINED	FUSAR	RHIZO	CURVUL	A.TAMA	A FUMI	PENIC	A.NIGER	A.FLAVUS	PHIALOM	CLADOS	TOTAL NO 0F ORGANISM ISOLATED
ODEKPE,	10	5	4	6	6	0	0	2	0	2	0	25
OHITA	5	3	1	1	0	0	2	2	0	0	1	10
OSSOMALA	10	5	5	2	4	0	0	3	1	0	2	22
AKILIOZIZO	10	1	1	1	2	0	3	5	0	0	0	13
UMUNAKWO	5	1	2	3	0	0	2	3	0	0	0	11
OGBAKUBA	10	5	2	1	4	3	1	3	1	4	0	24
OKPOKO	10	5	3	3	2	0	2	6	0	0	3	24
OCHUCHE	5	5	0	1	3	1	0	0	1	0	2	13
AMIYI	10	3	4	3	3	0	2	6	2	2	4	29
TOTAL	75	33(19.30)	22(12.87)	21(12.28)	24(14.04)	4(2.34)	12(7.02)	30(17.54)	5(2.92)	8(4.68)	12(7.02)	171(100)

4.10: TOTAL MEAN COUNT OF EACH INDICATORS ORGANISM ISOLATED FROM VARIOUS WATER SOURCES FROM DIFFERENT TOWNS

	E. coli cfu/100ml	Total coliform cfu/100ml	*Strep* cfu/100ml	*Clostridium* cfu/100ml
ODEKPE				
BORE HOLE	18.00±3.89	105.12±5.40	15.62±4.05	10.00±10.00
RESERVOIR	24.66±23.67	91.66±14.81	21.66±13.01	0.00±0.00
OHITA				
BORE HOLE	17.55±15.53	101.33±23.52	19.83±13.15	0.00±0.00
RESERVOIR	42.00±0.00	133.00±0.00	42.00±0.00	0.00±0.00
OSSOMALA				
BORE HOLE	6.60±3.68	76.00±13.15	18.00±8.45	0.00±0.00
MANUAL PUMP	23.00±22.00	56.00±42.00	19.00±19.00	0.00±0.00
STREAM	35.33±3.76	78.66±22.19	44.67±4.84	116.00±72.72
AKILIOZIZO				
BORE HOLE	29.20±5.66	41.40±11.67	20.80±7.43	41.40±11.67
MANUAL PUMP	8.50±3.50	80.00±45.00	17.50±2.50	80.00±45.00
STREAM	26.50±15.50	53.33±24.03	19.00±11.00	53.33±24.03
UMUNAKWO				
BORE HOLE	39.75±22.39	73.50±21.74	9.25±4.88	0.00±0.00
MANUAL PUMP	6.00±4.00	53.00±23.00	28.50±3.50	65.00±65.00
OGBAKUBA				
BORE HOLE	26.71±17.05	37.28±15.81	9.85±7.51	0.00±0.00
MANUAL PUMP	20.00±0.00	80.00±0.00	22.00±0.00	0.00±0.00
STREAM	5.50±5.50	120.00±34.00	33.50±6.36	75.00±75.00
OKPOKO				
BORE HOLE	13.20±4.48	30.20±8.20	10.50±4.94	0.00±0.00
MANUAL PUMP	15.00±0.00	83.00±23.00	35.00±5.00	200.00±0.00
STREAM	32.00±12.00	106.67±13.64	25.33±11.21	115.00±35.00
OCHUCHE				
BORE HOLE	15.80±7.53	35.00±24.31	3.00±2.00	24.00±24.00
MANUAL PUMP	4.00±4.00	64.00±24.78	22.33±3.78	36.66±36.66
STREAM	22.50±15.50	109.50±29.50	26.50±11.50	65.00±65.00
AMIYI				
BORE HOLE	2.50±2.50	21.25±6.57	0.00±0.00	0.00±0.00
MANUAL PUMP	8.50±6.50	21.00±9.00	22.00±22.00	0.00±0.00
STREAM	16.00±14.52	84.66±18.66	11.00±8.62	37.66±37.66
TOTAL	442.24±231.47	2155.35±481.4	571.39±168.7	3168.98±493.74

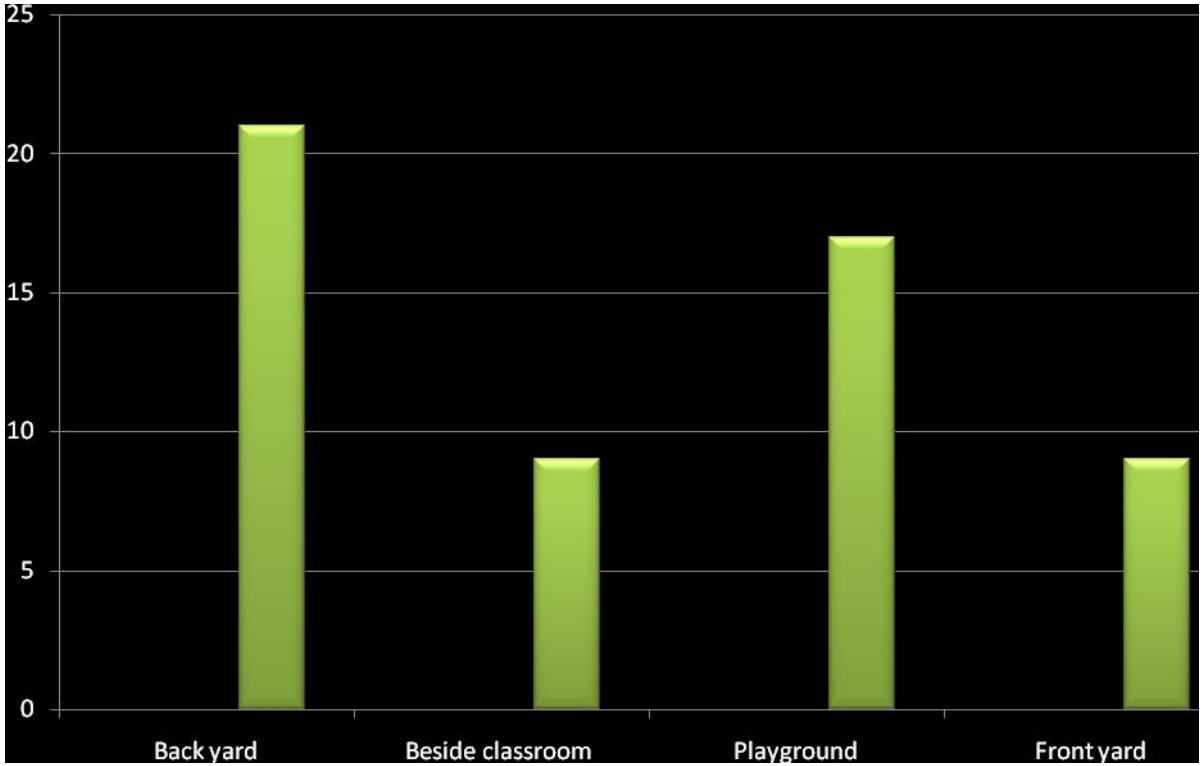
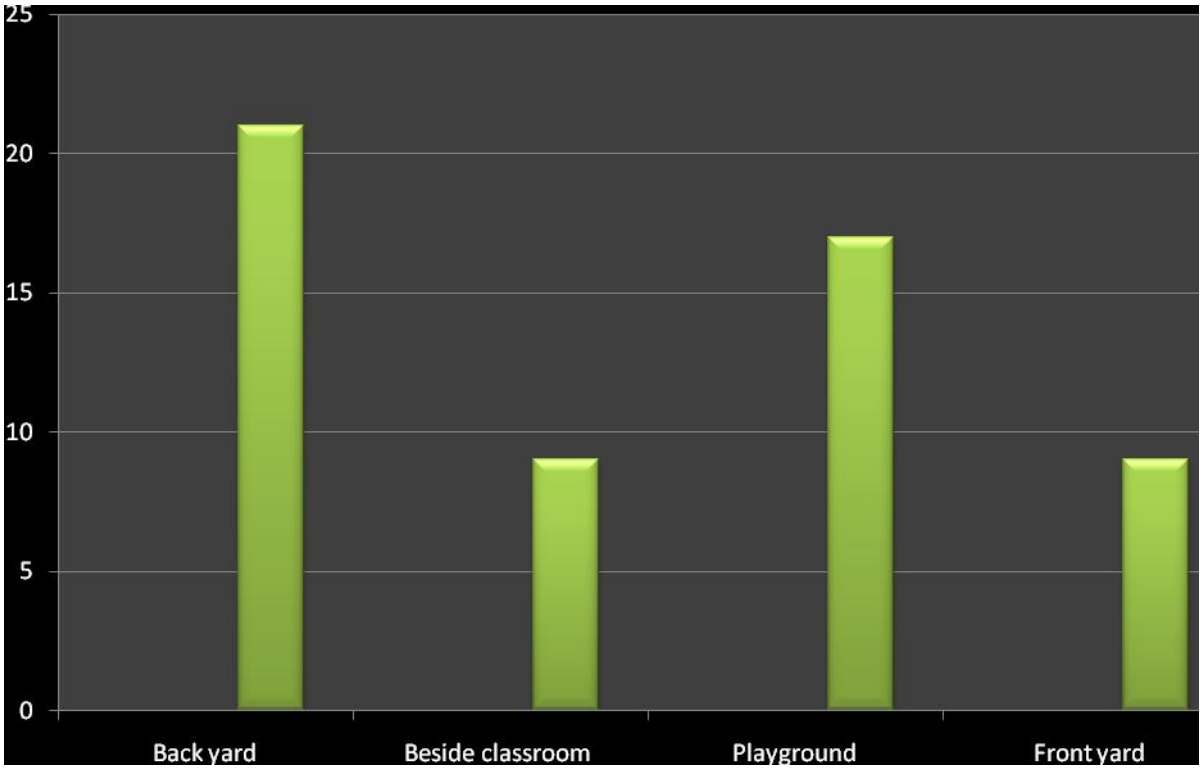


Fig 4.1: Distribution of Geohelminths from soil in different locations within schools environment in different towns



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OSSOMALA	10	5	5	2	4	0	0	3	1	0	2	22
AKILIOZIZO	10	1	1	1	2	0	3	5	0	0	0	13
UMUNAKWO	5	1	2	3	0	0	2	3	0	0	0	11
OGBAKUBA	10	5	2	1	4	3	1	3	1	4	0	24
OKPOKO	10	5	3	3	2	0	2	6	0	0	3	24
OCHUCHE	5	5	0	1	3	1	0	0	1	0	2	13
AMIYI	10	3	4	3	3	0	2	6	2	2	4	29
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MANUAL PUMP	20.00±0.00	80.00±0.00	22.00±0.00	0.00±0.00
STREAM	5.50±5.50	120.00±34.00	33.50±6.36	75.00±75.00
OKPOKO				
BORE HOLE	13.20±4.48	30.20±8.20	10.50±4.94	0.00±0.00
MANUAL PUMP	15.00±0.00	83.00±23.00	35.00±5.00	200.00±0.00
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TOTAL	442.24±231.47	2155.35±481.4	571.39±168.7	3168.98±493.74

Discussion

A total number of 120 soil samples obtained from fifteen primary schools in nine communities were examined for geohelminthic parasites, of which 46.67% were positive for geohelminths. Chukwuma *et al*. [11] reported a prevalence of 53.6% in soil, 40.83% by Agbom *et al.* [12]. Nwoke *et al.* [13] reported a prevalence of 30.7%. Due to the fact that the adult stages of these worms reside in the intestine, the presence of the eggs in soil is indicative of faecal pollution [11]. Functional toilet is lacking in most of the schools and the pupils and trespasser usually defecate in the nearby bush surrounding the school even in the presence of functional toilet and the use of human and animal faeces to fertilize Farm land surrounding the schools results in the eggs of these parasites being washed into the school compound as run-offs when it rains leading to high contamination with eggs of these parasite of the school and surrounding environment.

From the fungi isolated from classrooms, the dominant species were members of the genera *Aspergillus* sp, *Fusarium* sp, *Culvularia* sp, and *Rhizopus* sp. The less prevalent isolates were *Cladosporium* sp. *Penicillium* sp and *Phialomonium* sp. Similar airborne and other closely related fungal isolates indoor have been reported by Durugbo *et al.*, [14], Njokuocha and Osayi [15], Adekunle [16] in Lagos. Shukla and Shukla [17] reported *Fusarium* sp, *Alternaria* sp, *Rhizopus* sp, and *Aspergillus fumigatus* as the dominant fungi in airborne fungi spores in the atmosphere of Industrial town of Korba-Chhattisgarh, India. *Rhizopus* sp in this study may be linked to many refuse dumps in the school near the classrooms. *Rhizopus* sp was also isolated by Olugbue, and Umouko [18] in their work on Airborne Fungi in the Indoor and Outdoor Environments of a Higher Institution in Nigeria and Ayanbimpe *et al*. [19] in their work on relationship between fungal contamination of indoor air and health problems of some residents in Jos.

Building materials such as ceiling tiles, wood, paint, carpet rugs, etc., present very good environment for growth of fungi [20,21] while population density can affect the quality of air in the environment [22]. Total elimination of exposure to airborne fungi is practically impossible however, indoor mold growth can be prevented or minimized by actively maintaining, inspecting, and correcting buildings for moisture problems and immediately drying and managing water-damaged materials as this will help reduce mold exposures and related health symptoms [23].

Conclusion

This investigation also suggests that all of the surface and ground water in Ogbaru local government area are unfit for human consumption and that mold colonization and indoor air Contamination is encouraged by state of the building and dampness. Further research is necessary to compliment this work on the effect of flood in this area and other flood affected areas. There should be collective effort engineered towards prevention from infection and treatment of already established cases.

References

1. Kondo H, Seo N, Yasuda T, Hasizume M, Koido Y (2002) Post-flood - infectious diseases in Mozambique. *Prehospital Disaster Medicine* **17**: 126–133.
2. Biswas R, Pal D, Mukhopadhyay SP (1999) A community based study on health impact of flood in a vulnerable district of West Bengal. *Indian Journal of Public Health*, **43**:89-90.
3. Vollaard AM, Ali S, van Asten HA (2004. Risk factors for typhoid and paratyphoid fever in Jakarta, Indonesia. *Journal of AMA*, 291:2607–2615.

4. Umara, BG, Dibal JM, and Isa AK (2007) Quality analysis of water from river kumadugu for human consumption and irrigation suitability. *Journal life and Environmental Science*, **9**(1): 521-526.
5. Arora DR, Arora BB (2010) Medical Parasitology. 3rd ed, CBS India. 17-195
6. Birmingham ME, Lea LA, Ndayiminje N, Nkurikiye S, Hersh BS, Wells JG, Ijeming MS (1997) Epidemic cholera in Brundi, Patterns of transmission in the Gadat Rift Valley lake Region. *Lancet* **349**: 981-983.
7. Cheesbrough M (2000) District Laboratory practice in tropical countries Cambridge University press, pp: 209-215.
8. Kennor GA, Clark HF, Kabler PW (1961) *Journal for Applied Microbiology*. **9**:15-20
9. Environmental Agency (2010) Microbiology of drinking water. Methods for Isolation and enumeration of sulphite reducing *Clostridia* and *Clostridium perfringens* by membrane filtration. UK. Part 6. Pp 7-19
10. Cheesebrough M (2010) District Laboratory practice in tropical countries. Part 2. CambridgeUniversity Press.
11. Chukwuma MC, Ekejindu IM, Agbakoba NR, Ezeagwuna DA, Anaghalu IC, Nwosu DC (2009) The prevalence and risk factors of geohelminth infections among primary school children in Ebenebe Town, Anambra State, Nigeria. *Middle – East Journal for Science Research.* **4** (3): 211 – 215
12. Agbom MC, Odikamnoro OO, Omowaye OS (2013) Soil helminthasis on farm land in Ebonyi State, Nigeria. *Unique Resarsh Journal of Agricultural Sciences*. **1** (5): 70-75
13. Nwoke EU, Ibiam GA, Odikamnoro OO, Umah OV, Ariom OT, Orji I (2013) Examination of soil samples for the incidence of geohelminth parasites in Ebonyi north-central area of Ebonyi State, south-east of Nigeria. *Archives of Applied Science Research,* **5** (6):41-48
14. Durugbo EU, Kajero AO, Omoregie EI, Oyejide NE (2013) A survey of outdoor and indoor airborne fungal spora in the Redemption City, Ogun State, south-western Nigeria. *Aerobiologia* 29:201–216
15. Njokuocha RC, Osayi EE (2005) Airborne pollen and spore survey in relation to allergy and plant pathogens in Nsukka, Nigeria. *Bio-Research*, **3**(1): 77–84.
16. Adekunle AA (2001) Airborne fungi from some eating places on the University of Lagos, Akoka Campus, Nigeria. *Bioscience Research Communications*. **13**(5): 517–522.
17. Shukla S, Shukla RV (2011) Airborne fungi spores in the atmosphere of industrial town, Korba-Chhattisgah, India. *Microbiology Journal*, **1** (1): 33-39.
18. Olugbue VU, Umouko N (2013) Airborne Fungi in the Indoor and Outdoor Environments of a Higher Institution in Nigeria. *International Journal of Advanced Biological Research*. **3**(1): 9-12
19. Ayanbimpe GM, Danjuma SW, Okolo OM (2012) Relationship Between Fungal Contamination of Indoor Air and Health Problems of Some Residents in Jos, Air Quality – Monitoring and Modeling, Dr. Sunil Kumar http://www.intechopen.com/books/air-quality-monitoring-and-modeling/-relationship-between-fungalcontamination-of-indoor-air-and-health-problems-of-some-residents-in-jo
20. Morey PR (1999) Indoor Air Quality, Fungi, and Removal of Fungal Colonization.
Presented at: Mealy Sick Building Litigation Conference November 1999. West Palm Beach, Florida.
21. Heseltine E, Rosen J (2009) WHO Guidelines for Indoor Air Quality: Dampness and Mold. WHO Europe Damness and Molds. www.euro.who.int
22. King N, Pierre A (2002) Indoor air quality and health. *Canadian Family Physician*. **48**:298-302.

23. Kercsmar C, Dearborn D (2006) Reduction in Asthma Morbidity in Children as a Result of Home Remediation Aimed at Moisture Sources. *Environmental Health Perspectives*: **114**(8): 1574-1580.

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