

# Effect of Indoor Air Pollution on Man's Health in Ado Metropolis, Ekiti State, South-Western Nigeria

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**Abstract:** This research work was carried out to investigate the effects of indoor air pollution on man's health in Ado Metropolis of Ekiti State Nigeria. Indoor air pollution poses many challenges to man's health. The objective of this research work is to assess the effect of indoor air pollution on residents of Ado Metropolis and ascertain the knowledge of the target group on the cause and effects of indoor air pollution. Using a stratified random sampling technique, One hundred questionnaires were designed and administered to the respondents, the researchers also engaged personal interview and observation for proper interpretations, all data elicited were tabulated and analyzed using simple percentages and graphical representations where necessary. The study revealed that the level of indoor air pollution in Ado Metropolis is relatively high hence the risk of exposure is relative. It is easily seen that hazards associated with indoor air pollution have tremendously affected the health of people in the community owing to different complaint of respiratory illness and secondary data showing the number of respiratory related illness from 2018 – 2019. It was therefore concluded that regular exposure to indoor pollutants has negative impact or effect on the health of Ado residents. More worrisome is the several attempts of some of the respondent in self-management of the effects of indoor air pollution which is very dangerous. It was therefore recommended that regular exposure to heat radiation should be discouraged by providing adequate ventilation in various homes while Government and enforcement agencies should help in enacting laws that will regulate the production of materials that will generate carbon monoxide, EHOs should also engage in public awareness to reduce exposure and perpetual non-adherence to health and safety rules.

**Keywords:** Pollution, Pollutants, Indoor, Carbon-Monoxide, Air, Hazard

## I. INTRODUCTION

Indoor Air pollution poses many challenges to man's health. According to Oluwande (2008), every day the average person inhales about 20,000 litres of air which are both natural and human-based. With every breath, we are at risk of the inhalation of toxic gases that are present in the air. Air pollution can be found both outdoors and indoors, pollutants can be trapped inside building causing indoor pollution that lasts for a long time. The sources of air pollution can be anthropogenic and nature based. Humans are known to generate waste be it liquid, solid or gaseous. Our activities on daily basis is progressive as we continue to alter the natural state of the environment and thereby exposing ourselves in the process.. The effects of poor air qualities are far more

reaching; it affects the body respiratory system and cardiovascular system. Indoor air pollution has been a major problem throughout history because people spent 65 to 90 percent of time indoors. Humans probably first experienced harm from air pollution when they made fires in poorly-ventilated dwellings since then we have gone on to defile more of the earth's surface, until recently, environmental pollution problems have been local and minor because the earth's own ability to absorb and purify minor qualities of pollutants. In industrialized nation, the introduction of motorized vehicles and the explosion of the population problem, at this time it is urgent that we find methods to clean up the air. The problem will continue to persist as long human continue to exploit the environment. Pollutants from various homes are trapped in-door and inhaled at every chance. Most clubs are known to encourage smoking herbs, cigarette and shisha, the active and passive smokers in this regard are both exposed. There is no doubt that the multiplying effect of the exposure to these pollutants are sometimes long-term while some are otherwise. Some of the effects includes allergies, influenza, common cold while some can be independently or in combination with stress, work pressure and seasonal discomfort. According to Global Health Risks mortality and burden of diseases attributable to selected major risks, indoor air pollution is responsible for 2.7% of the global burden of disease. (WHO, 2002). Cooking and heating with solid fumes on open fires or traditional stove results in high levels of indoor air pollution. Indoor smoke contains a range of health damaging pollutants such as small particles and carbon monoxide. In poorly ventilated dwelling, indoor smoke can exceed acceptable levels for small particles multiplied by 100. Exposure is particularly high among women and men, who spent most time near the domestic hearth.

This research work will enhance the people of Ado Metropolis to be alerted to the dangers of indoor air pollution in the area and the preventive measures. Indoor air pollution should be discouraged in the study area as indoor air pollution may be two to five times, and possibly higher than outdoor-pollution due to limited airspace.

### *Objective*

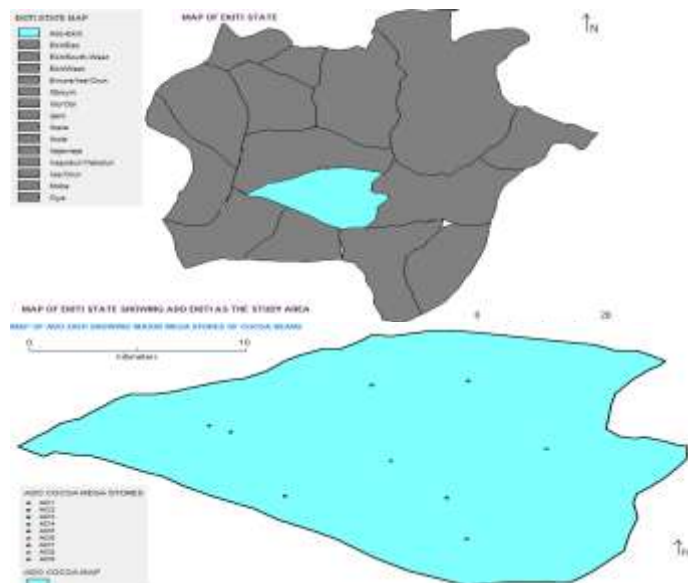
- i. Ascertain the knowledge' of the target group on the causes and effects of indoor air pollution,

- ii. Investigate the effects of indoor air pollution in the study area
- iii. Assess the level of compliance on the prevention and regulation of indoor air pollution in the area.

## II. METHODOLOGY

### Study Area

The study area is Ado-Ekiti in Ekiti state. It is located in south west Nigeria. Ado Ekiti is a semi-urban center which is the capital of Ekiti state. It is also the largest town and capital of Ekiti state. The town has a population of roughly 313,690 people as at last census in 2006. The people of Ado Ekiti are mainly Yoruba, Ibos, Hausas and other nationalities. The religion practiced by people of Ado Ekiti include Christianity, Islam and traditional religion, occupation trading and civil servants. The health facilities that serve the town include comprehensive health centres, and Ekiti State University, teaching hospital (EKSU). There are three tertiary institutions in the town which include, University of Ado Ekiti, Federal polytechnic Ado Ekiti and school of nursing Ado Ekiti.



### Sample Size and Sampling Techniques

Stratified random sampling techniques was employed with used to carry out the investigation in Ado Ekiti. The population of study are the inhabitants of Ado - Ekiti and the sample of study are 100 respondents.

### Instrument Design

The instrument used in the course of this research was questionnaire designed by the researcher, 100 questionnaires were designed structurally on Yes or No basis.

### Validation of Instrument

Validity test was carried out on a group different from actual population selected for this study with the test result @ 0.89.

## III. DATA ANALYSIS

The entire questionnaire were collected, collated and tabulated for data analysis. In analyzing the data, percentages (0/0) and pie chart were used

Table 1: Showing Personal Information of the Respondents.

S/N	Seleted Questions	Response	Frequency	Percentage
1	Gender	Male (M)	35	35
		Female (F)	65	65
		Total	100	100
2	Age Group	11-20	20	20
		21-30	65	65
		31-40	10	10
		41 And Above	5	5
		Total	100	100
3	Level Of Education	Tertiary	70	70
		Secondary	20	20
		Primary	5	5
		Arabic	3	3
		None	2	2
		Total	100	100
4	Religion	Islam	25	25
		Christianity	65	65
		Traditional	6	6
		Others	4	4
		Total	100	100

Source: Field Survey, 2020.

Table II: Probable Causes of Indoor

### Air Pollution, the Responses of the Respondents

S/N	Seleted Questions	Response	Frequency	Percentage
5	Is The House A New House?	Yes	18	18
		No	82	82
		Total	100	100
6	What Do You Use	Gas	30	30

	For Cooking?	Stove	45	45
		Firewood	10	10
		Coal Pot	15	15
		Total	100	100
7	Is Your Home Usually Dusty?	Yes	82	82
		No	18	18
		Total	100	100
8	Door Any Funny Pet Live Indoor?	Yes	55	55
		No	45	45
		Total	100	100
9	Do You Use Fuel Base Lamp?	Yes	92	92
		No	8	8
		Total	100	100
10	Do You Use Pesticides?	Yes	25	25
		No	75	75
		Total	100	100
11	Any Persistent Odour Around The Home?	Yes	18	18
		No	82	82
		Total	100	100
12	Do You Use Aerosol?	Yes	15	15
		No	85	85
		Total	100	100
13	Does The Symptoms Change With Season?	Yes	36	36
		No	64	64
		Total	100	100
14	Does The Symptoms Persist After Leaving The Room?	Yes	28	28
		No	72	72
		Total	100	100

Source: Field survey 2020.

Table III: Hazards/Symptom Related To Indoor Air Pollution

S/N	Selected Questions	Hazards	Frequency	Percentage
15	Which Of The Following Hazard Symptom Is Felt?	Dizziness	3	3
		Eye Irritation	35	35
		Respiratory Problems	28	28
		Nasal Congestion	1	1
		Running Nose	20	20
		Headache	8	8
		None	5	5
		Total	100	100

Source: Field Survey 2020.

Table IV: Management of Indoor Air

S/N	Selected Questions	Products	Frequency	Percentage
16	Is There Proper Ventilation In Your Home?	Yes	55	55
		No	45	45
		Total	100	100
17	Which One Do You Use Frequently From The Following Cleaning Products?	Oven Cleaners	3	3
		Furniture Polish	48	48
		House Hold Cleaners	12	12
		Carpet Shampoos	35	35
		Home Cleaners	42	42
Total	100	100		

Source: Field Survey 2020.

### Analysis of Tables

Tables I: shows the personal information of the respondents

Tables II: shows the cause of the indoor air pollution

Table III: shows the hazards related to the indoor air pollution

Table IV: Shows the management of indoor air pollution

### IV. PIE CHART

Table II: Question 5, 6 And 7 Showing the Probable Cause of Indoor Air Pollution

#### Question 5 (Is the house new?)

Yes = 18 Respondents represent 18%

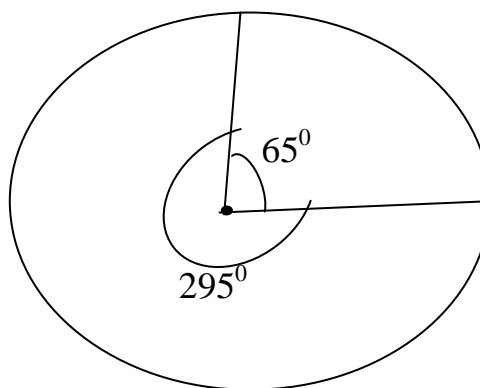
No = 82 Respondents represent 82%

$\frac{100}{100}$

$$\text{Yes} = \frac{18}{100} \times \frac{360}{1} = 65^{\circ}$$

$$\text{No} = \frac{82}{100} \times \frac{360}{1} = 295^{\circ}$$

Figure I



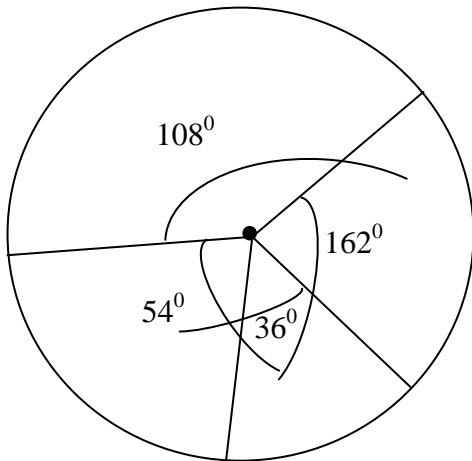
The pie chart above shows that weather the home is new, 82 respondents represented 295° say No. therefore is shows that most of the respondents were living in old building.

Question 6 (What do you use for cooking?)

GAS	=	30	respondents represent	30%
STOVE	=	45	respondents represent	45%
FIREWOOD	=	10	Respondents represent	10%
COAL POT	=	<u>15</u>	Respondent represent	<u>15%</u>
TOTAL	=	<u>100</u>		<u>100%</u>

$$\begin{aligned} \text{GAS} &= \frac{30 \times 360}{100 \times 1} = 108^{\circ} \\ \text{STOVE} &= \frac{45 \times 360}{100 \times 1} = 162^{\circ} \\ \text{FIREWOOD} &= \frac{10 \times 360}{100 \times 1} = 36^{\circ} \\ \text{COAL POT} &= \frac{15 \times 360}{100 \times 1} = 54^{\circ} \end{aligned}$$

Figure II



The pie chart above shows the source of power supply used for cooking, 45 respond outs represented 162° use stove for cooking therefore, it shows that most of the respondents uses stove for cooking.

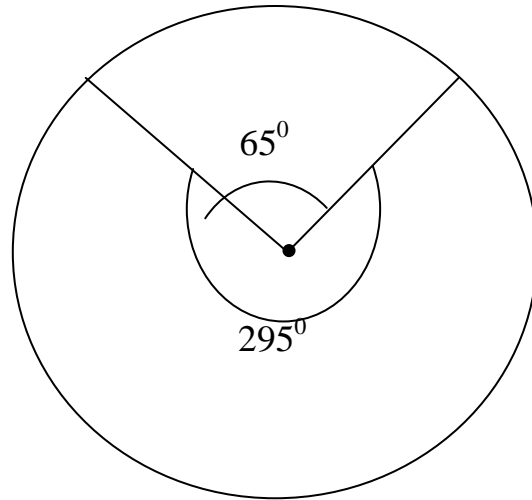
Questions 7 (Is your home usually dusty?)

Yes	=	82	Respondents represent	82%
No	=	<u>18</u>	Respondents represent	<u>18%</u>
		<u>100</u>		<u>100</u>

$$\text{Yes} = \frac{82}{100} \times \frac{360}{1} = 295^{\circ}$$

$$\text{No} = \frac{18}{100} \times \frac{360}{1} = 65^{\circ}$$

Figure III



The pie chart above shows weather the lamp is usually dusty, 82 respondents represented 295° therefore it show that majority of the respondent says Yes.

Table II Question 13 shows how the symptom change with season

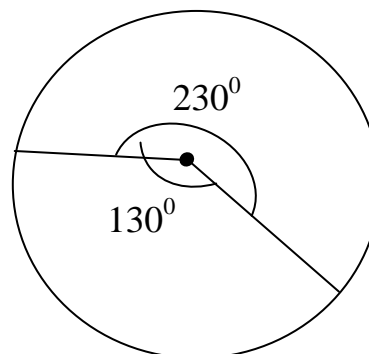
Yes (Change with season) = 36 Respondents represent 36%

No (does not change with season) = 64 Respondents represent 64%

$$\text{Yes} = \frac{36 \times 360}{100 \times 1} = 130^{\circ}$$

$$\text{No} = \frac{64 \times 360}{100 \times 1} = 230^{\circ}$$

Figure IV



The pie chart above shows how the symptom change with season, 64 respondents represented 230°. Therefore, it shows that the symptom does not change with season.

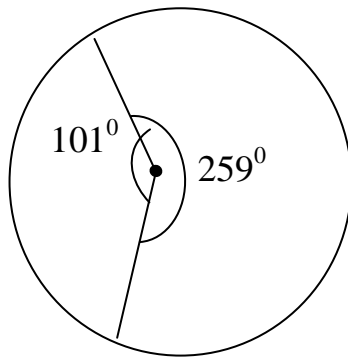
Table II Question 14 shows whether the symptoms persist after leaving the room.

Yes (Persist)	= 28	Respondents represent	28%
No (Not persist)	= <u>72</u>	Respondents represent	<u>72%</u>
	100		100%

$$\text{Yes} = \frac{28}{100} \times \frac{360}{1} = 101^{\circ}$$

$$\text{No} = \frac{72}{100} \times \frac{360}{1} = 259^{\circ}$$

Figure V



The pie chart above shows whether the symptoms persist after leaving the room 72 respondents represented 259°. Therefore, it shows that the symptoms do not persist after leaving the room.

Table III Question 15 Shows the Hazard Related To Indoor Air Pollution

Dizziness	= 3	Respondents represent	3%
Eye irritation	= 35	Respondents represent	35%
Respiratory problems	= 28	Respondents represent	28%
Nasal congestion	= 1	Respondent represent	1%
Running nose	= 20	Respondent represent	20%
Headache	= 8	Respondent represent	8%
None	= <u>5</u>	Respondent represent	<u>5%</u>
	<u>100</u>		<u>100%</u>

$$\text{Dizziness} = \frac{3}{100} \times \frac{360}{1} = 11^{\circ}$$

$$\text{Eye irritation} = \frac{35}{100} \times \frac{360}{1} = 126^{\circ}$$

$$\text{Respiratory problem} = \frac{28}{100} \times \frac{360}{1} = 101^{\circ}$$

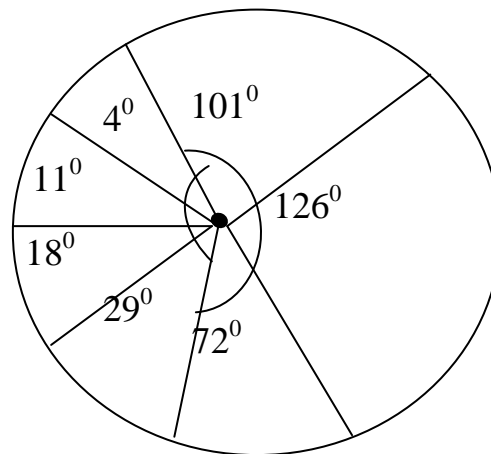
$$\text{Nasal Congestion} = \frac{1}{100} \times \frac{360}{1} = 4^{\circ}$$

$$\text{Running nose} = \frac{20}{100} \times \frac{360}{1} = 72^{\circ}$$

$$\text{Headache} = \frac{8}{100} \times \frac{360}{1} = 29^{\circ}$$

$$\text{None} = \frac{5}{100} \times \frac{360}{1} = 18^{\circ}$$

Figure VI



The pie chart above shows response of respondents to the related hazard pose to them 35 respondents represented by 126°. Therefore it's shows that majority of the respondents felt eye irritation.

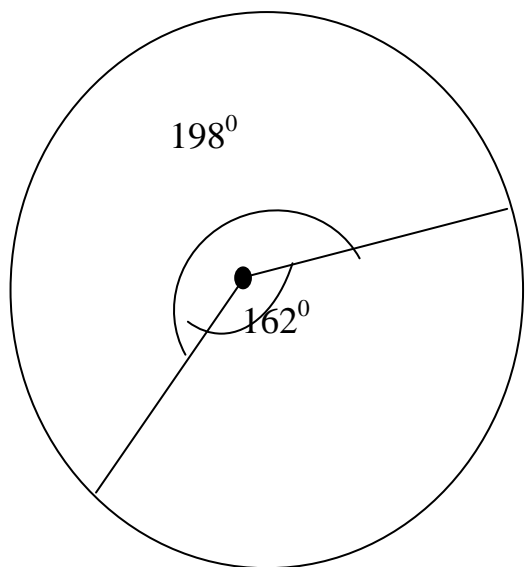
Table IV Question 16 showing if there is proper ventilation in the home.

Yes (Proper ventilation)	= 55	Respondents represent	55%
No (Poor Ventilation)	= <u>45</u>	Respondents represent	<u>45%</u>
	100		100%

$$\text{Yes} = \frac{55}{100} \times \frac{360}{1} = 198^{\circ}$$

$$\text{No} = \frac{45}{100} \times \frac{360}{1} = 162^{\circ}$$

Figure VII



The pie chart above shows if there is proper ventilation in the home, 55 respondents represented 198°, says there is proper ventilation. Therefore it shows that the home is well ventilated.

Table IV Question 17 Shows the Management of the Above Cases

Oven cleaners	= 3 respondents represent	3%
Furniture polish	= 8 respondent represent	8%
House hold cleaners	= 12 respondent represent	12%
Carpet shampoos	= 35 respondent represent	35%
Home Cleaner	= 42 respondent represent	42%
	100	100%

$$\text{Oven Cleaners} = \frac{3}{100} \times \frac{360}{1} = 11^\circ$$

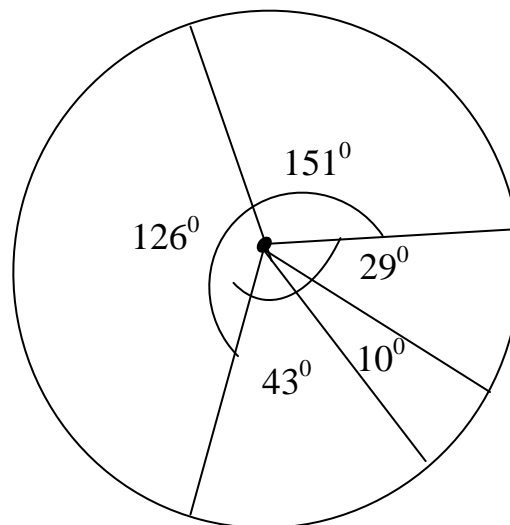
$$\text{Furniture Polish} = \frac{8}{100} \times \frac{360}{1} = 29^\circ$$

$$\text{Household cleaners} = \frac{12}{100} \times \frac{360}{1} = 43^\circ$$

$$\text{Carpet Cleaner} = \frac{35}{100} \times \frac{360}{1} = 126^\circ$$

$$\text{Home cleaner} = \frac{42}{100} \times \frac{360}{1} = 151^\circ$$

Figure VIII



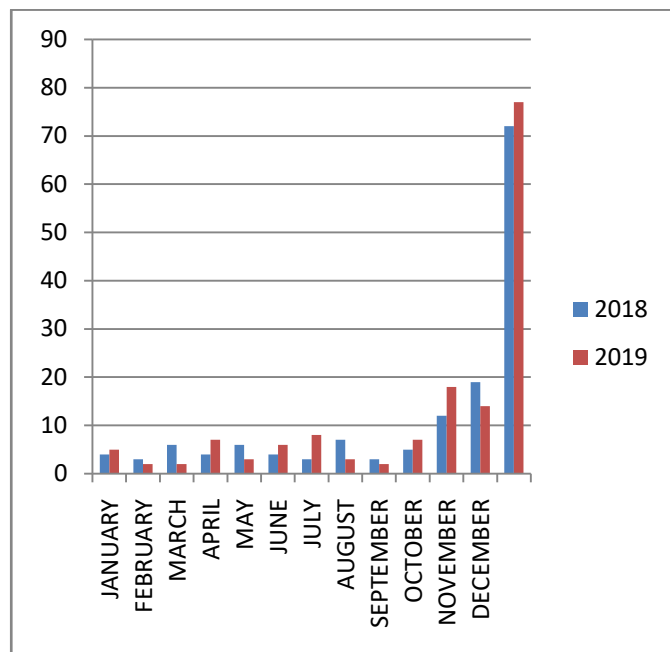
The pie chart above shows how the respondents manage the hazards pose to them. 42 respondents represented by 151°. Therefore it shows that majority of the responded manage it by home cleaner.

Table Showing Secondary Data of Reported Cases of Respiratory Illness from 2018-2019 in the Study Area

S/N	Months	2018	2019
1	January	4	5
2	February	3	2
3	March	6	2
4	April	4	7
5	May	6	3
6	June	4	6
7	July	3	8
8	August	7	3
9	September	3	2
10	October	5	7
11	November	12	18
12	December	19	14
Total		72	77

Source: Ek Data Bank

Figure Showing Reported Cases Of Respiratory Illness In The Study Area.



## V. DISCUSSION

All the data obtained through the questionnaire from the people in Ado – Ekiti were therefore interpreted as follows. From the questionnaire analysis, Table 1 number 1 deals with the percentage distribution of respondents, it is clear that majority of the respondents are female because the percentage is 65% while male are 35%. Also, Table 1 number 2 shows the age group of the respondents, age group 11-20 are 20%, 21-30 are 65%, 31-40 are 10% and 41 above carries 5%. Table 1 number 3 shows the level of education of the respondents, those of tertiary carries 70%, secondary carries 20%, primary carries 5%, Arabic carries 3%, None carries 2%.

Table 1 number 4 talks about their Religion of the respondents, it shows that Islam carries 25%, Christianity carries 65%, Traditional carries 6% and others carried 4%. Table II number 5 shows if the house is new from the analysis 18% respondents say Yes while majority 82% say No, which means there is tendency of having old home material like carpet in the house. Table II number 6 deals with the source of power supply used for cooking. From the analysis 30% used gas, 45% used stove which increases the tendency of inhaling carbon monoxide capable of damaging their respiratory system when off the stove, 10% respondents used firewood and 15% respondents used coal pot. Table II number 7 shows weather the home is usually dusty, 82% of the respondents says Yes while 18% of the respondents says No, which means majority of the respondents are prove to Nasal congestion and running nose. Table III number 14 shows the response of respondents on the hazard symptom related to the indoor air

pollution, the analysis shows 3% felt dizziness, 35% has eye irritation, 28% has respiratory problems, 1% has Nasal congestion, 20% has running nose, 8% has headache whole 5% has none. Table IV number 16 shows weather the house is properly ventilated, the analysis shows 55% of respondents says is properly ventilated while 45% respondents says No. Table IV number 17 shows that management of the dust in the home by the respondents, 3% of respondents used oven cleaner, 8% of the used furniture polish, 12% used household cleaners, 35% used carpet shampoos while 42% used home cleaners. This shows the majority of the respondents used home cleaners.

## VI. CONCLUSION

Findings from this study revealed that the level of indoor air pollution in Ado-Ekiti is relatively high. It was also discovered that there are several attempts of some of the respondent in self-management of the effects of indoor air pollution which is very dangerous. While the causes of indoor air pollution in the study area can be attributed to lack of awareness of the public, it was also noted that non-challant attitude of the public and relevant agencies to constant generation and exposure to the pollutants is of concern. It was also concluded that regular exposure to heat radiation has negative impact or effect on their health because majority of the respondents adopted the use of charcoal pot, stove and firewood for cooking. In conclusion, indoor air pollution endangers human health in all ramifications, it poses a great threat to life and effective management of it could go a long way in promoting and enhancing healthy living.

## VII. RECOMMENDATIONS

The following measures have been suggested as solutions to the effects of indoor air pollution on man's health in Ado-Ekiti.

- Regular exposure to heat radiation should be discouraged by providing adequate ventilation.
- The government should help in enacting laws that will regulate the production of materials that will generate carbon monoxide.
- Cooking with charcoals, store and firewood inside ill-ventilated room should be discouraged.
- The environmental Health Officer should embark on mass Health Education to the people of Ado-Ekiti on effects of indoor air pollution.
- Whenever cooking is in progress, all ventilating and opening should be opened.
- Cooking should be done in a well-ventilated kitchen to allow free flow and proper discharge of pollutants.
- The people should try as much as possible to attend any seminar organized for them by the health expert without minding the cost.
- People should always be far away to where pollutant is generated.

- People should try as much as possible to cook with less polluting cooking materials.

#### CONFLICT OF INTEREST

The Authors declares no conflict of interest

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