THE INTERNATIONAL JOURNAL OF HUMANITIES & SOCIAL STUDIES

Resident's Perception of Late Evening Air Pollution in Geidam Town Yobe State, Nigeria

Ibrahim Abubakar Audu
Graduate Assistant, Department of Environmental and Resource Management,
Usmanu Danfodiyo University, Sokoto, Sokoto State, Nigeria
Dr. Usman Adamu
Lecturer, Department of Geography,
Yobe State University Damaturu, Yobe State, Nigeria

Abstract:
Air pollution being one of the most acute problems in developing countries especially their cities is one of the most important constituents of man '.v environment. An average human being requires about 12 kg of air each day, which is nearly 12 to 15 times greater than the amount of food consumed. Clean and pure air is very essential for human health and survival. One hundred and twenty (120) respondents were used for the study; data were collected with structured questionnaire and through interview scheduled. The study employs an outcome mapping evaluation approach in order to assess the different dimensions of changes in mindsets, contexts, altitudes, and perception that motivate interaction relationship and behavior. Descriptive research design method was used for the study. Data were analyzed using descriptive statistical tools such as percentage computation, frequency distribution table, bar chart, and pie chart. The finding established that; Majority of the population of Geidam are aware about the scenario of air pollution in their environment, change in atmospheric condition mostly occur during the early morning hours and late evening hours with a decline during the day hours, the increase in the morning and evening hours occur due to high rate of utilization of carbon energy emission in the morning and evening. The research recommends that reduce emission strategies can help in curtailing the impact of air pollution in Geidam. Reduce emission can be implement when an alternate source of energy emission is provided. The government should provide an alternate source of energy with less emission such as solar energy and electric energy which will further replace the coal and carbon energy sources. Sensitization and awareness campaign on the effect of air pollution can serve as vital tool in controlling the impact of air pollution in the environment. The government and institutional bodies should sensitize the general public on activities that reduce the emission of air pollution in the community

Keywords: Pollution, population, utilization, emission, carbon, temperature

1. Background to Study

Air pollution being one of the most acute problems in developing countries especially their cities is one of the most important constituents of man's environment. An average human being requires about 12 kg of air each day, which is nearly 12 to 15 times greater than the amount of food consumed. Clean and pure air is very essential for human health and survival. Any change in the natural and normal composition of air that may adversely affect the living system, particularly the human life invariably causes air pollution (Garg et al, 2006)

Air pollution is the presence of toxic chemicals or compounds including those of biological origin in the air, at levels that pose health risk. In an even broader sense, air pollution means the presence of chemicals or compounds in the air which are usually not present and which lower the quality of the air or causes detrimental changes to the quality of life such as damaging of ozone layer or causing global warming.

According to Anjaneyulu, (2005) air pollution is generally defined as the presence in the outdoor atmosphere of one or more contaminants such as fumes, dust, gases, mist, odor, smoke, smog or vapor in considerable quantities and duration which is injurious to humans, animals and plants life or which unreasonably interferes with the comfortable enjoyment of life and property. Thus air pollution is generally regarded as disequilibrium condition of air caused by the introduction of foreign elements from natural and manmade sources to the air so that it becomes injurious to biological communities. Anjaneyulu, (2005).

The World Health Organization (WHO) defines air pollution as limited to situations in which the outer ambient atmosphere contains materials in concentrations which are harmful to man and his environment. In a study by Gags et al. (2008) conducted in 2007 showed that small household generators in Nigeria operate an average of six (6) hours daily, while average distance of generator away from buildings was 5.6m. These alongside poor ventilations have negatively influenced the quality of indoor air in the households causing air pollution.

The distribution of industries in Nigeria is not uniform as they are concentrated in the urban centers. Major industrial centers in the country include Lagos, Port Harcourt, Ibadan, Kano and Kaduna. The industries range from oil and gas, chemicals, cement, textiles, iron and steel, plastics etc. (Ibrahim, 2004). Furthermore, uncontrolled urban growth has resulted in the expansion of residential buildings very close to the industries. These industries release large quantities of gaseous wastes into the air which are sources of air pollution. In our smaller towns or semi urban areas like Geidem that have no industries the situation may be different. The incineration of domestic waste material, burning of fuel wood for cooking and other domestic energy needs among other things contribute to air pollution especially in the late-evening periods.

1.1. Location of the Study Area

Geidam local government area of Yobe State is the third largest local government in Yobe State. It located north east to Damaturu. It was created in 1976 as one among the local government in former Borno state, with its headquarter in Geidam. It consists of 19 villages units with an area of 4,35km2. Geidam lies between latitude 11°40'38'Nto 12053', 49'N and 1l045'49'E to 11°56'40'E (local government information unit,).
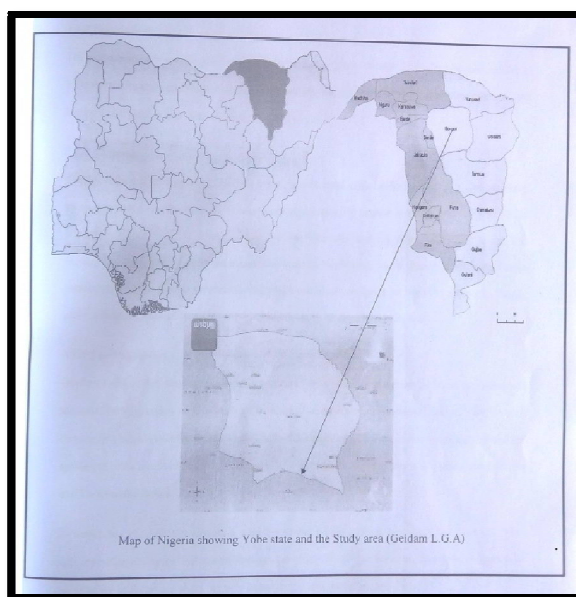

Figure 1: Map of Yobe State Showing Geidam Local Government Area
Google Earth 2016

1.1.1. Population

The population of Geidam local government is put at approximately 157, 295 people according to 2006 census and predominantly inhabited mainly by Kanuri tribe and other ethnic group, like Hausa and Fulani which are the minorities in the area.

1.1.2. Climate

The prevailing climate in the area is the semi - arid tropical climate (Sudano-Sahel) characterized by short raining season of less than four months and a long dry season of about 8 months with a wide seasons variation in annual temperature relative humidity and dry bright sunshine hours. The raining season begin in early June and terminate in September while the dry season start from October to May each year for most part of the year. There is no precipitation from November to March, and the heavy's rainfall ranges from 408 to 503mm (L.G.A information unit).

1.2. Statement of Research Problem

Air pollution being one of the greatest challenges of the 21st century to both developed and developing countries has a significant impact toward determining the environmental qualities of country. Late evening Air pollution often causes serious threat to environmental and public health. The emission of the carbon monoxide by vehicles in the evening affects environmental factors of the town (Biotic and Abiotic). This can be reflected in its consequences as it causes acute respiratory diseases such as Bronchitis, Emphysema, Asthma, and Lung cancer. The late evening air pollution may also carbon dioxide which increase the night temperature. Geidam is a relatively small town compared to major cities in Nigeria, However, significant amount of air pollutants is frequently observed in the town especially in the evening. The sources, nature and likely effects of these air pollutants need to be understood. In particular, an understanding of the residents' perception of these pollutants is important if appropriate measures are to be taken to mitigate their deleterious consequences on human health in the town.

Air pollution has also been known to have caused widespread damage to trees, fruit, vegetables, flowers and in general vegetation as a whole.

1.3. Aim and Objectives of the Paper

The aim of this study is to examine the resident's perception on late evening air pollution and its effects on human health in Geidam town taking in to account the peoples' culture as an important factor. The specific objectives are:

- To examine the perception of people on the causes of late evening air pollution as an environmental problem in (he study Area;
- To examine the effects of the late evening air pollution in the study Area;

1.4. Significance of Study

Late evening air pollution is one of the features of urban micro climate affecting other environmental elements in diverse dimensions. In particular, it reduces and deteriorate the quality of natural atmosphere. The significance of this paper therefore is to ameliorating the negative effects of late evening air pollution which fundamentally requires the understanding of the nature of the problem especially as perceived by those who are directly or indirectly involved in generating the pollutants and are also living with it as victims. This research therefore serves as an instrument that aid in raising awareness to the people living in such communities about the effects, the causes and required actions to ameliorate the effects. It also serves as a stimulus for further research and management of the problem especially by the relevant government parastatals, such as the ministry of environment.

2. Review of Literatures

Srinivas (1999) attempted to look at the spatial patterns of air pollution in Delhi, for Sulphur dioxide (SO_2), oxides of nitrogen (NO_2) and suspended particulate matter (SPM). The concentration of suspended particulate matter has exceeded from the National ambient air quality standards with the highest average values always above 380 g/m3 at various seasons in Delhi were proved and some strategies have been suggested to reduce air pollution in the city of Delhi. An ambient air quality with special reference to the total oxidants was assessed in the four selected sites in Tiruchirappalli which was studied by Ravichandran el. al, (2001). The concentration of Sulphur dioxide and oxides of nitrogen were sampled along with the total oxidants and it was found to be within the prescribed limits. Air pollution has pushed many plants and animals towards extinction and rapid changes in climate due to deposition of air pollutants to large distances from their source due to the influence of meteorological factors (Tripathy and Dwivedi, 2002). Formation and destruction behavior of oxides of Sulphur during combustion was studied by Vedamadavan (2012) for a wide range of temperature and found that the conversion of Sulphur dioxide into Sulphur trioxide is only temperature sensitive, dependent and significant.

Garg, A., et ai, (2002) analyzed that the Indian Large Point Sources (LPS) contribute to carbon dioxide and Sulphur dioxide emissions to a large extent and useful for policy-making to mitigate these pollutants and their associated impacts.

Khaiwal et. al, (2003) reported that the importance of rainfall in the scavenging of the criteria of air pollutants like SO_2, NO_2 and TSP which have significant decrease in concentrations at Shahdara in Delhi, after initial and subsequent rains of the monsoon. An interesting relationship between population density and Suspended Particulate Matter (SPM) and Reparable Suspended Particulate Matter (RSPM) concentration has been observed by Rajendra (2004) which hardly depends upon the local meteorology and climate of the place rather it depends upon the local polluting sources. Dust pollution caused by vehicles in Aligarh city was observed by Lone, P.M., et al, (2005) where the dust pollution was maximum on Kanpur road (46.44 gm/m2/month) followed by Agra road (38.94 gm/m2/month) and Delhi road (34.52 gm/ m2/month) and minimum on Anoopshahar road (20.10 gm/ m2/month) and the average dust fall rate per unit area about 35 gm/ m2/month in Aligarh city was recorded.

Aromar Revi (2008), gave the global attention is currently focused on the quantification of implications of climate change due to natural and anthropogenic sources. Rising levels of greenhouse gases are responsible' for rapid changes in climate system.

The concentration of the air pollutants such as Sulphur dioxide, oxides of nitrogen, suspended particulate matter (SPM) and reparable suspended particulate matter (RSPM) emissions are more affected in winter seasons, vehicular and industrial increasing areas of Chennai city which was proved by Gokhale S.B, (2004). through spatial distribution. The elemental concentrations of heavy metal pollutants that may be present in street dust samples in Mubi, Adamawa state, Nigeria, inferred by Shinggu F.et al., (2007) and suggested that these pollutants did not originate from common anthropogenic sources because some heavy metals are soil derived automobile emission, welding of metal and exhaust from generators may be the major sources of the elements.

2.1. Sample Size and Sampling Techniques

The population of interest in all heads of household in the four wards of Geidam town was Singe considered. However, for total coverage of the large population random sample of respondents was be selected from the list of all registered head /household in the town using the statistical random number table. In this case the sampling frame is the Primary Heath Care house listing/numbering of Geidam Local Governments Primary Health Care Unit was used.

The sample size for the study was base the adoption Saunders et al (1997) criteria (see the table below). Geidam town has an estimated household population of about 15000. At a 95% level of significance, allowing an error margin of 5% (Saunders et al 1997), and applying Saunders' sampling criteria, the appropriate-sample size that represented the study population is 370. However, in view of time and resource constraints at the disposal of the researcher, a sample size of 370, though most appropriate, is still large. We opt to adopt a common criteria accepted by other researchers.

Anjaneyulu, Y. (2005) was of the view that there is no clear-cut answer to what constitutes an acceptable minimum sample size because the correct sample size depends on the purpose of the study and the nature of the population under scrutiny. However, the authors advice that in all cases the larger the sample si/e the better, as this not only gives greater reliability but also enables more sophisticated statistics to be used. Thus, they suggest that a sample size of thirty (30) is the minimum number. For this study therefore we adopt a sample size of thirty (30) for each of the four wards (Hausari, Ashakri, Ajari, and Kafela) in Geidam and thus giving us a total sample size of 120 for the whole town.
The margin of error for selecting sample sizes for different population sizes at a 95% confidence level.

Population Size	Sample Size by Margin of Error			
	5%	3%	2%	1%
50	44	48	49	50
100	79	91	96	99
150	108	132	141	148
200	132	168	185	196
250	151	203	226	244
300	168	234	267	291
400	196	291	343	384
500	217	340	414	475
750	254	440	571	696
1 000	278	516	706	906
2000	322	696	1091	1655
5000	357	879	1622	3288
10000	370	964	1936	4899
100000	383	1056	2345	8762
1 000 000	384	1066	2395	9513
10000000	384	1067	2400	9595

Table 1: Sample Size and Sampling Techniques
Source: Saunders, Lewis and Thornhill (1997)

2.2. Data Analysis
The data generated for this study was presented in both tables and graphs. The data was analyzed using descriptive statistics such as percentage and mean and standard deviations. It is envisaged that the Statistical Package for Social Sciences (SPSS) will be employed as the software for data organization and analysis.

3. Data Presentation
The data collected from the field in the (chapter three) were analyze and presented using descriptive statistical techniques. Where bar graphs, pie charts and frequency table where used as an instrument to present the data. Considering the nature of the research, a single type of questionnaires was distributed to the general public on the effect of air pollution.

4. General Information of the Respondents
General information about the respondent's location, sex, ages, marital status, occupation and education level of the respondents were collected and analyzed as follows:

Wards	Frequency	Percentage%
ASHAKRI	30	25%
AJARI	30	25%
KAFELA	30	25%
HAUSAR1	30	25%
TOTAL	120	100%

Table 2: Sampled Wards Selected
Source: Field Survey, 2018

The table above shows the wards of where the questionnaires were distributed. Thirty piece questionnaires were giving to each ward selected under study because based on Anjaneyulu, (2005) suggested a sample size of thirty is held by many as the minimum number of cases.fig.4.1 below shows the diagrammatic sampled wards
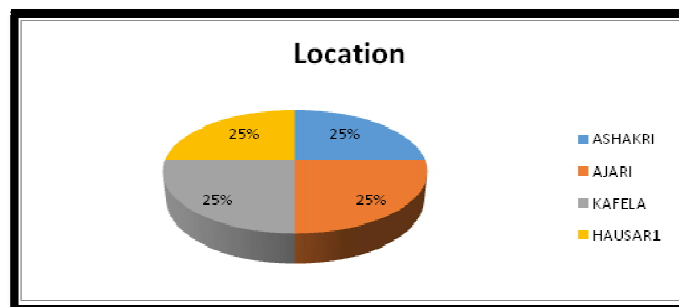

Figure 2
Source: Field Work 2018

Occupation	Frequency	Percentage (%)
Civil servant	57	47.5%
Farmers	35	29.2%
Student	27	22.5%
Housewives	1	0.8%
Total	120	100%

Table 3: Occupational of the Respondents
Source: Field Survey, 2018

The table above shows the occupational of the respondents, majority of the respondents are civil servant representing about 47.5% of the study population, also farmer's population represent large proportion of the study sample with about 29.2%. Hence only few percent of the population are students with 22.5% and housewife (0.8%). From the information shown in the table above. It reveals greater percentage of the respondent are civil servant. The figure below is a diagram showing the occupational level of the respondents.
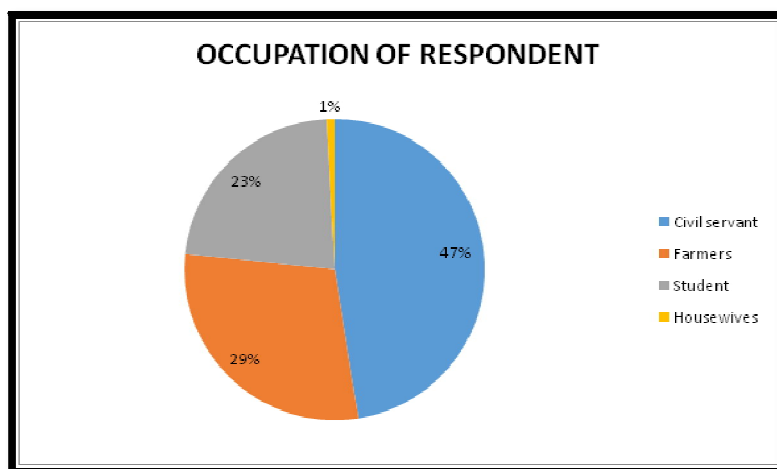

Figure 3: Occupation of the Respondents

Options	Frequency	Percentage
Yes	112	93.3%
No	8	6.7%
Total	120	100%

Table 4
Source: Field Survey, 2018

The rate at which air pollution is experience in the study area, 93.3% responded yes, while 6.7 % responded No. this is an indication that majority of the population responded that they experience change in the atmospheric condition of their environment (93.3%). Only less than 6.7% disbelieve with the change experience. Below fig. is a diagrammatic representation showing how people experience air pollution.
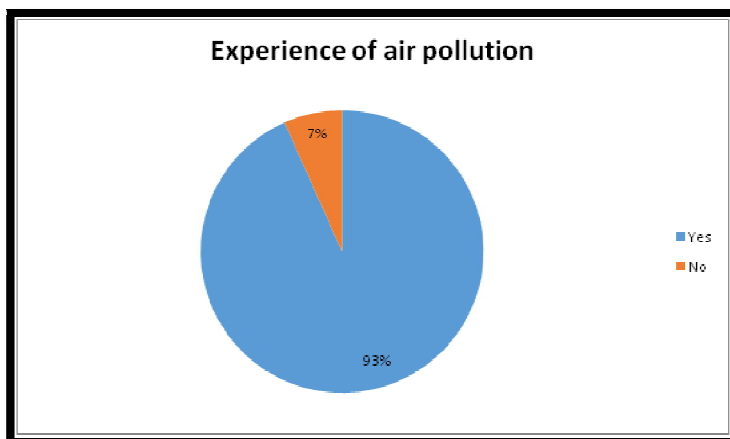

Figure 4: Experience of Air Pollution in the Area

Perception of Air Pollution	Frequency	Percentage (%)
Natural Change in color and odor of the air	74	66.1%
Artificial change in color and odor of the air	29	25.9%
Reduction in visibility	2	1.7%
All of the above	7	6.3%
Total	112	100%

Table 5: Perception of Air Pollution
Source: Field Survey, 2018

From the table above the perception of Air pollution in the study area indicates that 66.1% of the population have experience change in the atmospheric condition of the environment, natural change in color and odor of the air due to the increase carbon emission and greenhouse gases. However, some of the respondent have experience this change in the air quality in terms of artificial change in color and odor of the air with 25.9%. Other respondents experience change but due to reduction in visibility with 1.7%, Thus about 6.3%   believe they have experience change in all the options highlighted in the table above and can also be depicted in the figure below.
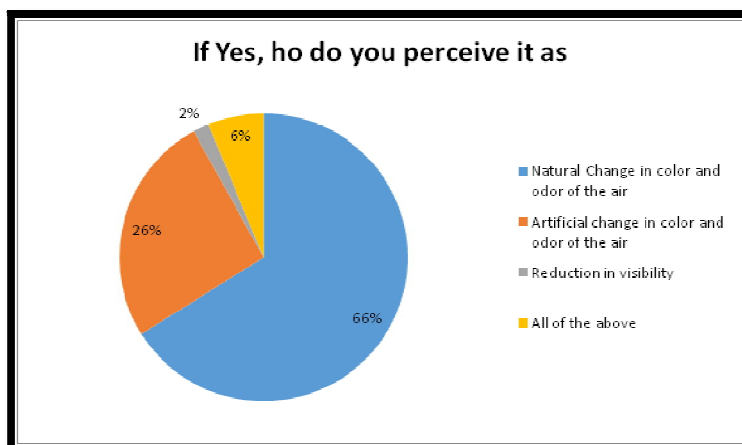

Figure 5: Air Pollution Experienced Timings

Time	Frequency	Percentage (%)
Morning	33	27.5%
Afternoon	8	6.7%
Evening	79	65.8%
Total	120	100%

Table 6
Source: Field Survey, 2018

Respondents views revealed in the above table that majority of them experience change in the atmospheric condition in the evening hours which account for 65.8% as, but it reduces significantly to 6.7% during in the afternoon. while in the morning the rate of air pollution rises to 27.5%. Based on what was obtained in the table, it clearly reveals that the resident of Geidam experiences air pollution mostly in the late evening. Hence the increase and decrease of air pollution during the day occurred due the high utilization of energy source that emits carbon by mostly vehicles and generator at commercial centers.

Places	Frequency	Percentage (%)
Market place	15	13.4%
Motor park	89	79.5%
Abattoir	1	0.9%
Other	7	6.2%
Total	120	100%

Table 7: Location Places Affected by Effect of Air Pollution
Source: Field Survey, 2018

Based on the respondent's views in the table above, it shows that the major cases of air pollution occur at the motor-park with 79.5%. Some incidence of air pollution cases of lower emission at market place which represent 13.4%, abattoir with 0.9% and other places such as households, organization among others with 6.2%. Thus the high emission of carbon at the motor park occur due to large number of vehicles that emit carbon everyday while for the market place and other place occur due the existence of carbon emission from generators, firewood burning, among other energy required materials that demand carbon energy

The study also revealed that one of the major sources of air pollution in Geidam is from transport and industrial activities with 55.4% which is more than half of the respondents. Sources of air pollution occurred due to mobility of vehicle and industrial activities that lead to high emission of carbon monoxide into the atmosphere. Thus agricultural activities such as farming (over cultivation and bush burning) directly the rate of deforestation, output processing among other contributes a significantly to the sources of air pollution in Geidam local government area with 26.8%. While domestics activities account for 14.3% and other household activities account for about 3.5% of the sources of air pollution in the Study area. It clearly reveals that the major sources of air pollution in Geidam are due transport and industrial activities as can be seen in the figure below.
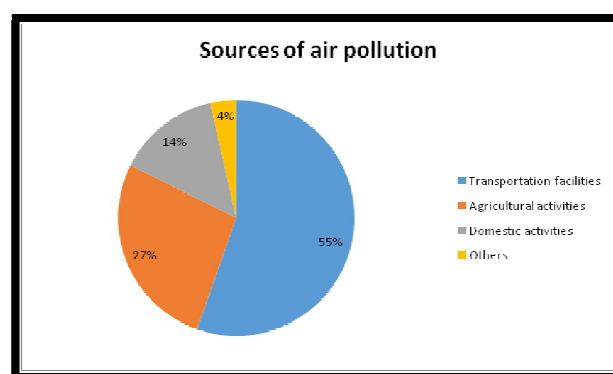

Figure 6: Source of Pollution

Causes	Frequency	Percentage
Natural	70	62.5%
Anthropogenic	22	19.6%
All of the above	20	17.9%
Total	112	100%

Table 8: Causes of Air Pollution
Source: Field Survey, 2018

The table above shows that one of the major causes of air pollution in Geidam is due to natural cause representing 62.5%, 19.6% are caused by anthropogenic factor. 17.7% are of the respondents viewed that air pollution is cause by both natural and anthropogenic factors. Based on what was reveal in the table above air pollution is mostly causes in the study area by natural factors.

Options	Frequency	Percentage
Yes	85	75.9%
No	27	24.1%
Total	112	100%

Table 9: Respondents views on Health Effect of Air Pollution
Source; field survey, 2018

The table above show whether air pollution has health effect or not. 75.9% of the respondents agreed that air pollution poses serious effect particularly on health while 24.1% disagree that air pollution has no effect on health. Air pollution causes airborne diseases such as meningitis. Asthma, coughing to mention but few. It clearly reveals that air pollution has effect on health. Below diagram is an indication to whether air pollution has effect on health or not.
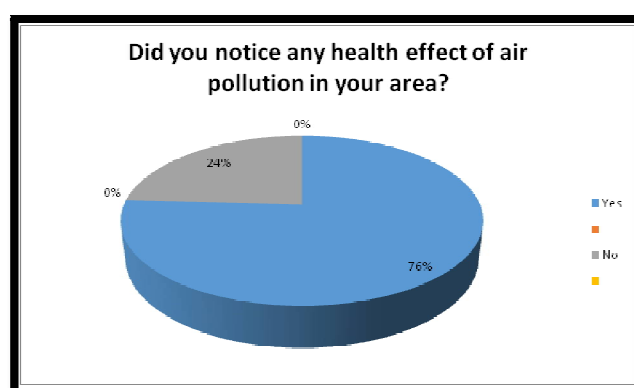

Figure 7

Rate	Frequency	Percentage
Fast rate	24	28.3%
Medium rate	41	48.2%
low rate	20	23.5%
Total	85	100%

Table 10: Respondents Views on Rate of Air Pollution in the Study Area

From the analysis of the respondent's views in the table above shows the rate at which air pollution affect health of the residence of the study area. 28.3% of the respondent believes that air pollution has health effect at fast rate; 48.2% are of the view that air pollution affects the health at medium rate in the study area while 23.5% believe that air pollution has affected their health on low rate. Based on what is shown on the above table, it clearly reveals that air pollution has effect on the health of the people.

Nature of Effect	Frequency	Percentage
Reduces visibility	11	12.9%
It leads to itching of the body	36	48.2%
It leads to itching of the eyes and noise	38	23.5%
Total	85	100%

Table 11: Nature of the Effect Air Pollution
Source; Field Survey, 2018

The table above presents the nature effect of air pollution on people. Majority of the population stated that itching of the eye and nose as well as the itching of body are the major effect of air pollution on human health which represent 48.2%, 12.9% are on the view that it reduces visibility, while 23.5% believe that it causes itching of the body.

Effect of Air Pollution on Farming	Frequency	Percentage
Late onset of rainfall	10	10.6%
Drying of crops	46	48.9%
Excessive temperature rise	35	37.3%
Others	3	3.2%
Total	94	100%

Table 12: Effect of Air Pollution on Farming
Source: Field Survey, 2018

The table above indicate that majority of the population explained that they have experienced change agricultural products due to the impact of air pollution in Geidam local government. 10.6% responded of the said that they have experience change in the climatic variables and their agricultural activities due to late onset of rainfall, 48.9% are of the view that it causes the drying of crops, 37.3% believe that it causes excessive increases in temperature rise with 3.2 % while others opined that air pollution affect the resident in the study area in other related aspect

5. Conclusion

Over the years air pollution has increased and as various data suggest it have still an upward trends. Air pollution has a detrimental role in the quality of clean air in Geidam atmosphere. The discharge of harm-full gaseous elements such as greenhouse gases, smoke, into the atmosphere has great impact in deteriorating the quality of the environmental component. This has been reflected in its effect on man and his environment, the increase in urban temperature, encroachment of desert extinction of biodiversity, reduction of farmlands and soil quality, deterioration of clean air. eye contaminations and the increase in respiratory and skin infection including bronchitis, asthma, and cancer as well as skin rashes on the residents of Geidam.

6. Recommendation

Reduce emission can be implement when an alternate source of energy is provided. Government at all level should provide an alternate source of energy with less emission such as solar energy and electric energy which will further replace the coal and carbon energy sources. However, sensitization and awareness campaign on the effect of air pollution can serve as vital tool in controlling the impact of air pollution in the environment. Government and institutional bodies should take a proactive measure in sensitizing the general public on activities that reduce the emission of air pollution in their immediate community.

7. References

i. Anjancyulu. Y. (2005). 'Introduction to Environmental Science' BS Publication Hyderabad India
ii. Aromar Revi (2008) Climate change risk: an adaptation and mitigation agenda for Indian cities. Environment and Urbanization, 20(1), 207-229.
iii. Garg, S. K., Garg, R. and Garg. R. (2006). 'Environmental Science and Ecological' Studies Delhi, Khanna Publishers Hyderabad India.
iv. Gokhale S.B, Patil R. S (2004). Modelling the size separated particulate matter (SSPMIO) from vehicular exhaust at traffic intersections in Mumbai. Environ Monit Assess, 98(1-3), 23-40.
v. Ibrahim, S. and Abdullahi, I. L. (2004), 'Constraints to Industrial Pollution Abatement in Nigeria'. ABU Zaria Nigeria
vi. Lone, P. M. (2005), 'Urban structures and air pollution' Atmos. Environ. 24, 43-48.Delhi India
vii. National Population commission. National Census 2006. Nigeria.
viii. Ravindra Khaiwal, Suman Morl, Ameena, J.S. Kamyotra and C. P. Kaushik (2003), Variation in Spatial Pattern of Criteria Air Pollutants Before and During Initial. India
ix. Senthilnathan T, Rajan R. D. (2003). PM10 concentration in the ambient air in Chennai city.J. Instn. Engrs. India. (Environ Engng Div). 83. 34-35.
x. Saunders, Mark et al. (2009): 'Research method for business studies' prentice, London
xi. Shinggu DY, Ogugbuaja VO, Barminas JT, Toma I (2007). Analysis of Street Dust for Heavy metal Pollutants in Mubi, Adamawa State, Nigeria, Int. J. Phys. Sci. 2(11): 290-293
xii. Srivastava S. etal., (2002) Development of personality in early and middle adulthood: Set like plaster or persistence change: Pub med experimental website (5) 1041-43.
xiii. Tripathy and Dwivedi, (2002): Effect of ambient air sulphur dioxide on sulphate accumulation in plants: Journal of Environmental Biology. CTriveni Enterprises, Lucknow (India).
xiv. *Vedamadavan and Sarithabanuraman. (2012) Assessment of Ambient Air Quality in Coimbatore City. Civil and Environmental Research, 2(1), 1-6.*