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## **Air pollution in Jalalabad city: its causes, effects, and solutions**

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**Abstract.** Air pollution refers to any physical, chemical, or biological changes in the composition of air that are detrimental to the life and health of living organisms. These changes have various factors, such as the increase of dust, gases, smoke and other undesirable substances. Air pollution has two types of causes. Natural causes and non-natural causes. The non-natural causes are caused by humans, and they include everything from food and drink to work and housing. The importance of the research study lies in the fact that the causes of air pollution in Jalalabad city have been identified and necessary solutions have been proposed. Furthermore, this issue is very critical and important in terms of protecting human life and health. The purpose of the research is to reveal the causes, effects, and solutions to air pollution. On the one hand, it has been made easier for the officials to take positive and effective measures to solve the matter. On the other hand, the public's responsibilities have also been laid out. As a result of the current work, the level of pollution in the air in Jalalabad city will go down. The research methodology is both qualitative and quantitative. The first part of the research is library research in which the most reputable and trustworthy published materials such as books, scholarly articles, and credible internet sites are used. The second part of the research is field research. For this part, questionnaires are used to gather information, which is then analyzed with SPSS software. As a result of the research study, it has been revealed that the level of air pollution in Jalalabad city is high and the main reasons are the lack of a regular transportation system, the abundance of garbage, the lack of attention of the officials, and the people's non-observance of urban cultural principles. Due to these factors, people experience various problems and diseases in society. The gathered information shows that the prevention of the problem can be done with the construction of a regular sewerage system for the city of Jalalabad, the attention of the citizens to urban culture and regular traffic management.

**Keywords.** Jalalabad city, Air pollution, causes and effects

## **1. Introduction**

There are numerous threats to the living environment that result in water pollution, soil pollution, or air pollution. Industrial and technological progress in human life and population growth have caused undesirable changes to the current climate in the world, causing people to face various problems and diseases. Air is a vital substance. Due to its non-existence, living and non-living creatures cannot live anymore, and with its pollution, the normal life of living organisms is disrupted. Nunn. Asia, has published a report on November 19, 2019. In this report, it is stated that in the year 2017, 26,000 Afghans lost their lives due to polluted air.<sup>1</sup> In addition, it can be said that air pollution is a very dangerous phenomenon and a major challenge to human beings' lives. Because polluted air causes various diseases in the community and seriously affects the normal lives of citizens. The topic of my research is air pollution. To find out what factors are involved in air pollution in Jalalabad city and what the solutions are.

## **2. Research questions**

1. What is the level of air pollution in Jalalabad?
2. What are the main factors of air pollution in Jalalabad city?
3. What are the effects of air pollution in Jalalabad city on people's lives and health?
4. What are the ways to prevent air pollution in Jalalabad city?

## **3. Research objectives**

1. To determine the level of air pollution in Jalalabad city.
2. To identify and explain the main factors and causes of air pollution in Jalalabad city.
3. To identify and explain the effects of air pollution in Jalalabad city on people's lives and health.
4. To discuss the prevention ways of air pollution in Jalalabad city.

## **4. Problem statement**

War, agriculture and livestock shortcomings, and other reasons have caused residents of rural areas to move to cities. Also, although the overall population is increasing day by day, the development of industries and urban living facilities has increased the number of people living in urban areas. The above factors are all negative factors affecting air pollution. The lack of familiarity with the urban culture and a lack of respect for the living environment on a large scale has caused air pollution, which has affected the lives and livelihoods of the residents of Jalalabad city. Moreover, it has caused problems in the health sector. Through this research, the causes of the research problem have been found, and the work plans and solutions needed to stop them have been made.

## **5. Literature review**

Air pollution is considered to be one of the major and critical global issues. A large number of research articles and surveys have been conducted about air pollution. But my research is limited to Jalalabad, the capital of Nangarhar province. So, for a better explanation of the issue, I will discuss it here in detail:

A research study on "Effects of polluted air on the human body and circulation" was conducted by the University of Manchester Research Institute in England on 20,000 people. According to this research, people are losing their lives due to heart attacks caused by air

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<sup>1</sup> <https://www.nunn.asia/155031> .Date. 1399/12/10. Time. 11:00 am.

pollution. Furthermore, the mentioned research shows that polluted air has a negative impact not only on the lives of human beings but also on the lives and health of animals.<sup>2</sup> This study was conducted in England, and the scope of this study is limited to the effects of polluted air on human health. But my research is related to Jalalabad city in Nangarhar province of Afghanistan, which is related to determining the causes of air pollution and appropriate and positive solutions.

The research was conducted by the Research Center of Azad Islamic University of Iran in the year (1397 AH) under the title of "Providing Solutions to Reduce Air Pollution in Tehran". In this research study, the causes of air pollution in Tehran city are determined and the ways of air pollution prevention are discussed, which is different from my research study. Because the causes of the air pollution in Tehran City are different from the city of Jalalabad, Nangarhar province, the results of the related studies are also different.<sup>3</sup>

Suanne Barrington, a lecturer at the University of Birmingham, collaborated with the World Food Organization on a study titled "Polluted Air and its Effects on the Health and Well-Being of Mothers and Children" in the year (2021). In this study, only the family environment was researched, and the effects on the health of the mother and children were discussed. But my research only focuses on the general causes and solutions of the air pollution in Jalalabad city, Nangarhar province.

In 1396 (AH), a research study titled "Effects of Environmental Pollution on General Health (Physical and Mental Health)" was conducted in Kabul, Afghanistan. The research is both library and laboratory-based. Air and water samples were collected from the regions during the field research, and people were interviewed. On the other hand, in the laboratory part, water, air, and sick people were examined. As a result of the research, it was found that air and water pollution have a negative impact on people's health and well-being.<sup>4</sup> This research is different from my research in terms of geography and different variables. On the other hand, the effects of polluted air and water were discussed in this research; but my research has been done on the causes and solutions of pollution in Jalalabad city, Nangarhar province.

A research study was conducted by Mohammed Saliqa and Hamid Kakhki Mahna in Mashhad, Iran. In this research study, the relationship between weather elements and air pollution was studied in terms of climate change. In this research, it has been revealed that there is a relationship between climate change and air pollution damage, and climate change affects pollution damage.<sup>5</sup> This research is also different from my research in terms of location and content.

A research study was conducted by Dr. Peng Yin and his colleagues in China under the title "Air pollution in the provinces of China and its effects on death and disease." In this research study, which was conducted widely in the populated cities and regions of China, the level of air pollution and its effect on the level of deaths and diseases were studied. According to the research, which was conducted in the year 2017, it has been shown that 1.2 million deaths in the year 2017 are related to air pollution. In this study, the period from (1990 to 2017) was taken into consideration. It is a good sign that the level of air pollution has decreased in China

<sup>2</sup> <https://www.mehrnews.com>. Date. 1399/12/11. Time. 11:48.

<sup>3</sup> <https://www.sid.ir/fa/journal/ViewPaper.aspx?id=316051>. Date. 1399/12/11. Time. 11:50 am

<sup>4</sup> Payandah Nik Abbas & colleagues. (1396H), Studying the effects of environmental pollution on general health (mental and physical health). Heinrich Bill Afghanistan, Kabul Afghanistan. PDF.

<sup>5</sup> Muhammad Saliqa & Hameed Kakhki Mahna. (1393 AH). Research of the relationship between climate elements and fluctuations in air pollution (case: Mashhad city). Geography and environmental hazards publication. Issue 14. (1394 AH). [https://geoeh.um.ac.ir/article\\_28654.html](https://geoeh.um.ac.ir/article_28654.html) ۱۳/۱۲/۱۳۹۴. Time. 12:12 PM.

compared to the past. On the contrary, the level of air pollution has increased during the past 27 years in 12 provinces of China.<sup>6</sup>

## **6. Research methodology**

The research methodology is both qualitative and quantitative. The first part of the research is library research in which the most reputable and trustworthy published materials such as books, scholarly articles, and credible internet sites are used. The second part of the research is field research. For this part, questionnaires are used to gather information, which is then analyzed with SPSS software.

## **7. Scope and limitations of the study**

In terms of geography, this research study is limited to Jalal City in Nangarhar Province, Afghanistan. The information related to this area has been collected. On the other hand, the topic is limited to figuring out what causes air pollution in the right places and figuring out how to stop and fix it.

## **8. Introduction to environmental pollution**

With the development of human civilization, the expansion of various arts, and the increase of the world population, the world is currently facing a problem called air pollution, which threatens the lives of people around the world. In this chapter, we are studying some topics related to environmental pollution as follows.

### **1.8 Introduction of pollution**

Those useless substances that cause disturbance, imbalance, and discomfort to living organisms in an environment are called pollution. Pollution can be in the form of chemicals or energy, such as sound, heat, or light, that pollute the environment.<sup>7</sup> A pollutant is a substance that has adverse effects on human health and quality of life in the environment.<sup>8</sup> It also prevents and interferes with the natural functions of the ecosystem.<sup>9</sup>

### **2.8 Introduction and types of environmental pollution**

Environmental pollution is the creation of substances that change the characteristics of the natural elements of the environment and have adverse effects on the living environment. In other words, the adverse change in the chemical and biological condition of soil, air, and water is called pollution.<sup>10</sup> There are different types of pollutants in the living environment. These pollutants harm the environment of humans, animals, and plants. There are many types of environmental pollutants, which come from different sources and have adverse effects<sup>11</sup> on the natural environment. A living environment remains healthy as long as the elements of the

<sup>6</sup> [https://www.thelancet.com/article/S2542-5196\(20\)30161-3/fulltext#%20](https://www.thelancet.com/article/S2542-5196(20)30161-3/fulltext#%20). Date. 1399/12/13. Time. 3:24pm.

<sup>7</sup> Mohammad Mohsin Sadiq (24 July 2017). Air Pollution. Retrieved from: <https://www.nunn.asia/134675>. Date. 1399/12/11 Time. 2:00pm.

<sup>8</sup> Syed Raqib Shah Hashmi (1396 AH). Environmental pollutants. Kabul Afghanistan. 11.

<sup>9</sup> The ecosystem was created by Tinsley in 1935 and defined as follows: the series of interactions between the physical and biological environment that occur naturally in a particular place is called an ecosystem or with the surrounding environment. The relationship between a living organism (human, animal, or plant) and its environment is called an ecosystem, or the functional relationship between living organisms and their environment is called an ecosystem. An ecosystem is a physical system that includes plants, animals, and microorganisms (a collection of living organisms) that interact with all the factors and physical components of the environment in a specific area. (<https://motamem.org/>. Date. 1400.1.29.

<sup>10</sup> Mohajeri, Ali. (1379 AH). Special crimes of governmental workers. Organization of Kehan publications.

<sup>11</sup> They are the actual and potential effects that harm the living environment and human life in the present or in the future. It causes damage to the strength of human societies in providing opportunities in terms of health, safety, economic, and cultural prosperity.

environment are healthy. Whenever the elements of the environment are polluted, the living environment is also unhealthy and polluted. Various groups of environmental pollutants have been discovered currently. such as air pollution, water pollution, soil pollution, nuclear and toxic pollution, thermal pollution, land pollution, ecological pollution, and sound pollution.<sup>12</sup>

### **1.2.8 Air pollution**

The earth's atmosphere has a thickness of 60 to 100 kilometers. This layer of air is called the atmosphere. In order to know about air pollution or polluted air, it is better to know about unpolluted air or clean air so that we can get information about impure or polluted air.<sup>13</sup>

The term "air" is applied to the delicate mixture of gases that surround the earth. The structure of this compound is 50 miles above the ground. Nitrogen and oxygen are the two gases that make up 99% of the atmosphere.<sup>14</sup> Any kind of substance added to the air to make the air polluted will have its physical and chemical properties changed. On this basis, these types of air pollutants are considered and classified as substances that cause significant changes to humans, animals, plants, or substances. Based on this, any natural or unnatural substance that comes from the air is classified as a pollutant. These materials are available as solid particles, liquid droplets, gases, or both types of mixtures.<sup>15</sup>

## **9. Causes of air pollution**

Generally, the causes of air pollution are categorized into two parts. Natural causes and non-natural causes.

### **1.9 Natural causes of air pollution**

The causes of air pollution include volcanic activity, burning of forests, smoke, carbon monoxide from burning, natural dust, and some types of wind and rain. One of the most serious environmental problems that most of the world is facing today is acid rain. Acidic rain is harmful to the ecology of the environment. The acid in the air is harmful to human health. Acidic rain was discovered in Britain in the last century in the 1800s.<sup>16</sup>

### **2.9 Non-natural causes of air pollution**

Regarding air pollution, Richmond and Kaufman drew a conclusion in their research that there is a causal relationship between energy income and consumption and the spread of pollution.<sup>17</sup> The important non-natural sources of air pollution include pollution from vehicles; pollution from the burning of various fuel materials; pollution from thermal power generation centers; pollution from industrial plants; and metal melting centers. Every year, these devices release a large amount of gas and harmful particles into the air, which causes daily diseases in the environment. In short, it can be said that the human causes of air pollution include the work and activity of humans and animals; technological processes; factory operations; vehicles; and air are all man-made pollutants.<sup>18</sup>

<sup>12</sup> Mohammad Ismail Saadat (1398 AH). Protecting the Environment of Life. Second edition. Godar Publishing Society. Jalalabad-Afghanistan. 37.

<sup>13</sup> Abu Bakr Ahmad bin Al-Hussein bin Ali al-Bayhaqi. Al-Sunan al-Kuba and Dhil al-Jawhar al-Naqi (344 AH). Publisher: Council of the Department of Systematic Knowledge located in India in the town of Hyderabad.

<sup>14</sup> Debiri, Mino (1389 AH). Environmental pollution (air, water, soil and dust). 7th edition. Etihad Publishing center. Tehran-Iran. 13-14.

<sup>15</sup> Payandah Nik Abbas & colleagues. (1396H), Studying the effects of environmental pollution on general health (mental and physical health). Heinrich Bill Afghanistan, Kabul Afghanistan. PDF. 45.

<sup>16</sup> <https://ps.warbletoncouncil.org/contaminacion-atmosferica-10933>. Date 1400/1/29. Time. 11:10 am.

<sup>17</sup> Richmond A. K. a & Kaufmann, R. K. (2006). Is There a Turning Point in the Relationship between income and Energy Use and/ or Carbon Emission? Ecological Economics (56). 176-189.

<sup>18</sup> Ezzati, Ramin, Arpanai & Jamshid. (2012) Air pollution and its effects on human health, Second Environmental Protection Congress, Hamedan.

**10. The causes, effects, and solutions of air pollution in Jalalabad city**

Detailed information about air pollution in Jalalabad city will be presented in this section, according to the above title. The collected data has been analyzed based on the field research. Totally, 300 people have been asked in this research study according to their age, sex, education, civil status, jobs, and residential areas, including people with different interests. The data from the field research has been collected on the basis of single structured questionnaire, which consisted of 26 questions, and one type of question has been asked of all the respondents.

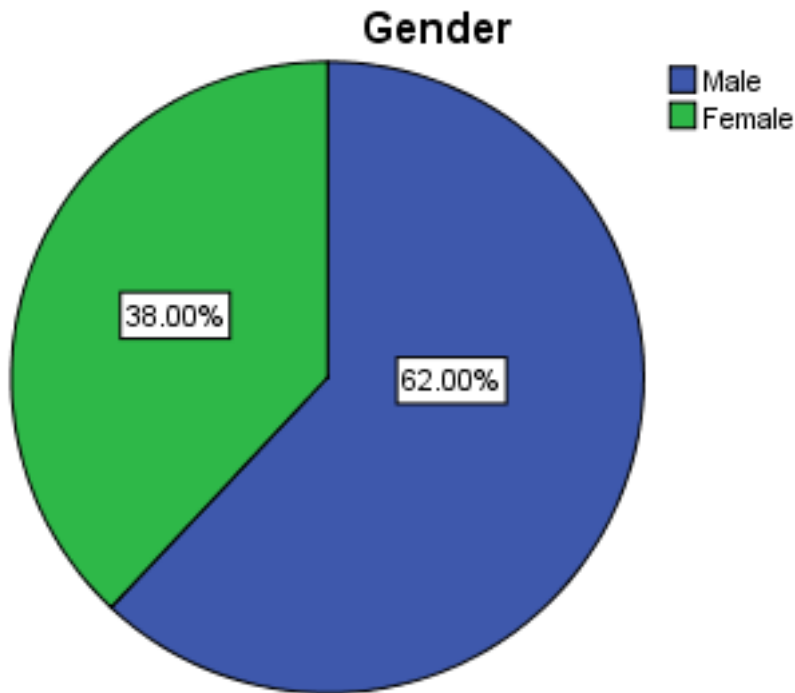
In this section, the questions in the first part are related to the general information of the respondents. In the second part, questions have been asked about the level of air pollution and its causes. Moreover, some questions have been asked about the effects of air pollution in Jalalabad city and its prevention methods.

The data analysis of the research is as follows. The figures of the analyzed data related to each question are presented in a frame. Then the explanation and analysis are presented. In the last part, the figures of the respondents are arranged by showing the percentage in the graphs.

**Question 1.** The first question of the research is about the gender of the participants in the research. The following information has been obtained from the responses of the respondents.

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	186	62.0	62.0	62.0
	Female	114	38.0	38.0	100.0
	Total	300	100.0	100.0	

Table 1. This table describes the gender of the respondents.

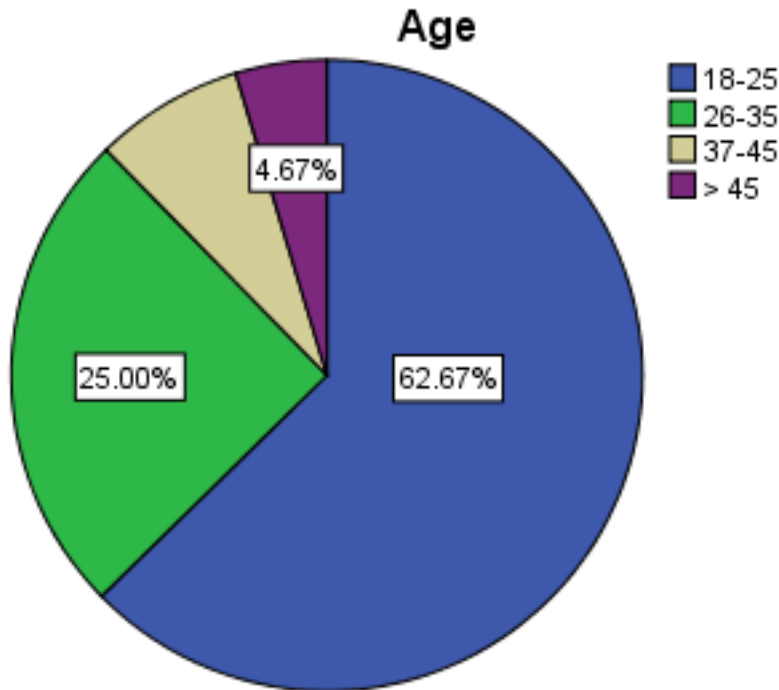


Graph 1. This graph analysis the gender of the respondents in the research study. Among the three hundred participants in the study, 62% are males and 38% are females who have answered the questionnaire.

**Question 2.** In this research question, information about the age of the respondents was collected, which included people of different ages.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 18-25	188	62.7	62.7	62.7
26-35	75	25.0	25.0	87.7
37-45	23	7.7	7.7	95.3
> 45	14	4.7	4.7	100.0
Total	300	100.0	100.0	

Table 2. This table describes the age of the respondents



Graph 2. This graph analysis the age of respondents in the research study

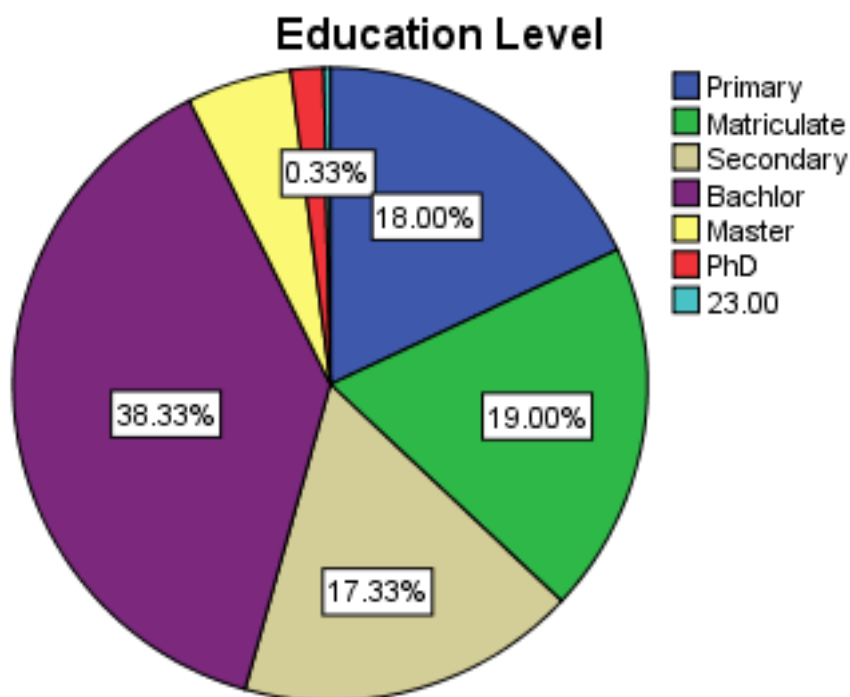
Based on the data obtained in this research, people of different ages have participated, and the analysis is presented accordingly. Those between the ages of 18 and 25 make up 62% of the respondents. Those aged between 26-35 make up 25% of the respondents. Those aged 36-45 make up 7.7%, and those aged over 45 make up (4.7%) of all respondents.

**Question 3.** This research question is about the level of education of the respondents. People with different levels of education have answered the question.

		Education Level			
		Frequency	Percent	Valid Percent	Cumulative Percent
This	Valid Primary	54	18.0	18.0	18.0
	Matriculate	57	19.0	19.0	37.0
	Secondary	52	17.3	17.3	54.3
	Bachelor	115	38.3	38.3	92.7
	Master	16	5.3	5.3	98.0
	PhD	5	1.7	1.7	99.7
	23.00	1	.3	.3	100.0
	Total	300	100.0	100.0	

Table 3. table

describes the level of education of the respondents



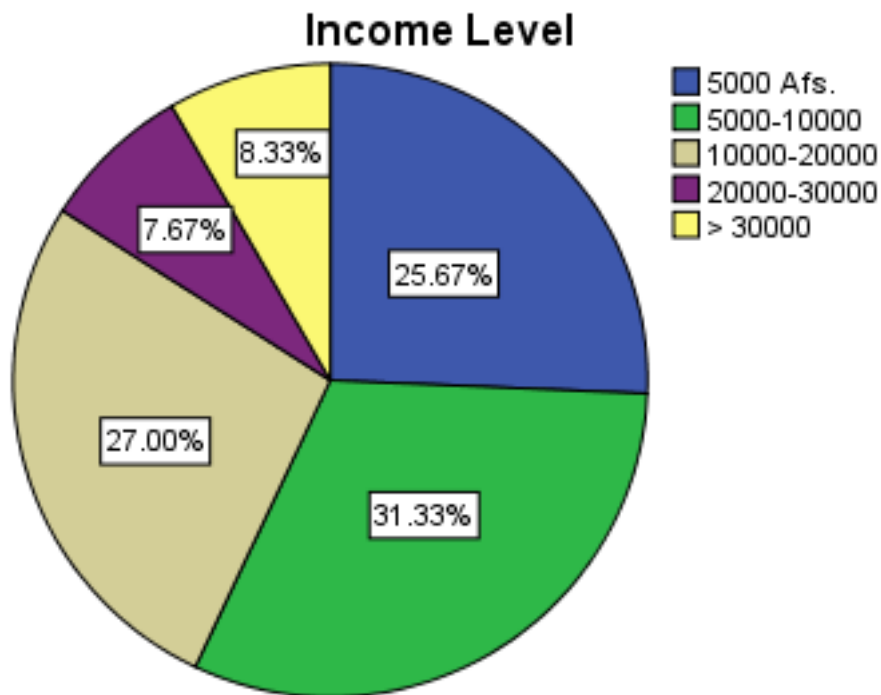
Graph 2. This graph analysis the education level of the respondents in the research study

In terms of education level, different categories of people participated in the research study. Those with primary education had an 18% increase. Those who had secondary education 19% were Those who had completed the twelfth grade 17.3%. Those with a secondary education up to the fourteenth grade 38.3%. Those who had a bachelor's degree 5.3% percent, and those who had master's and doctoral degrees 1.7%.

**Question 4.** This research question is about the income level of the respondents. People with different level of income have answered the question.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid 5000 Af	77	25.7	25.7	25.7
5000-10000	94	31.3	31.3	57.0
10000-20000	81	27.0	27.0	84.0
20000-30000	23	7.7	7.7	91.7
> 30000	25	8.3	8.3	100.0
Total	300	100.0	100.0	

Table 4. This table describes the level of income of the respondents



Graph 4. This graph analysis the income level of the respondents

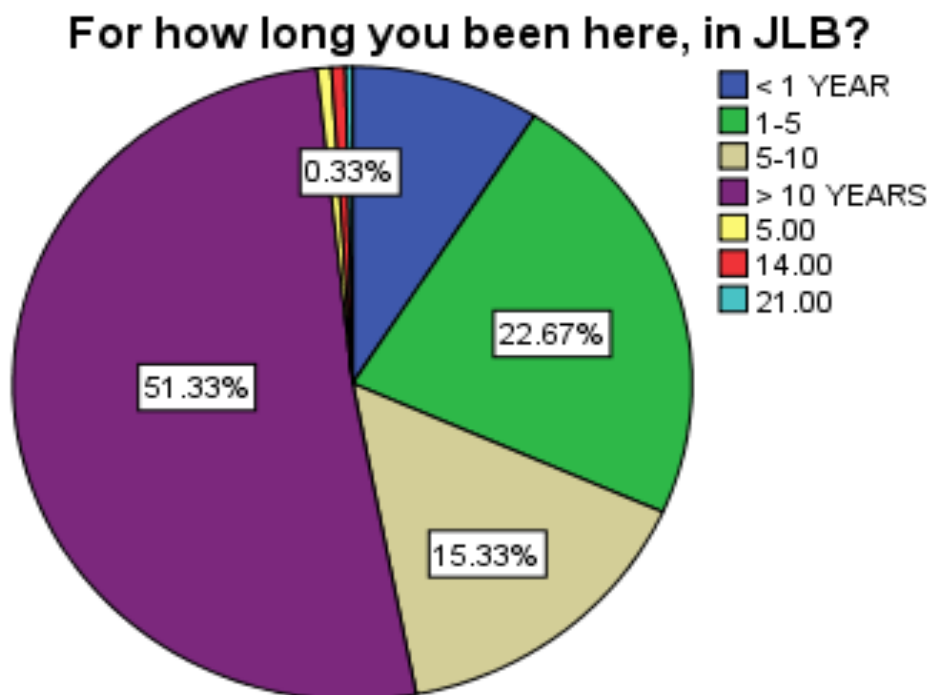
Those with a monthly income of up to 5000 Afghanis (25.7) Those who have an income between 5,000 and 10,000 Afghanis are 31.1%. Those with an annual income of between 10,000 and 20,000 Afghanis (27%) Those with an income between 20,000 and 30,000 Afghanis were 7.7%, and those with an income above 30,000 Afghanis were 8.3%.

**Question 5.** This research question is to know the level of knowledge of the respondents about Jalalabad city. So, the researcher asked the respondent, "How long have you been in the city of Jalalabad?"

**For how long you been here, in Jalalabad city?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid < 1 YEAR	27	9.0	9.0	9.0
1-5	68	22.7	22.7	31.7
5-10	46	15.3	15.3	47.0
> 10 YEARS	154	51.3	51.3	98.3
5.00	2	.7	.7	99.0
14.00	2	.7	.7	99.7
21.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 5. This table describes the length of staying of the respondents in Jalalabad city.



Graph 5. This graph analysis the staying length of the respondents in Jalalabad city. The data obtained in the analysis shows that 9% of the people who have stayed in Jalalabad city for less than one year. People who lived in Jalalabad for one to five years make up 22.7 percent of the population. 15.3% of the population has lived in Jalalabad for between 5 and 10 years. Those who have lived in Jalalabad city for more than ten years make up 51% of the respondents, and the rest of the respondents did not answer this question. The analysis showed that a high percentage of the people asked have overall knowledge of Jalalabad city because they lived in this city for a long time.

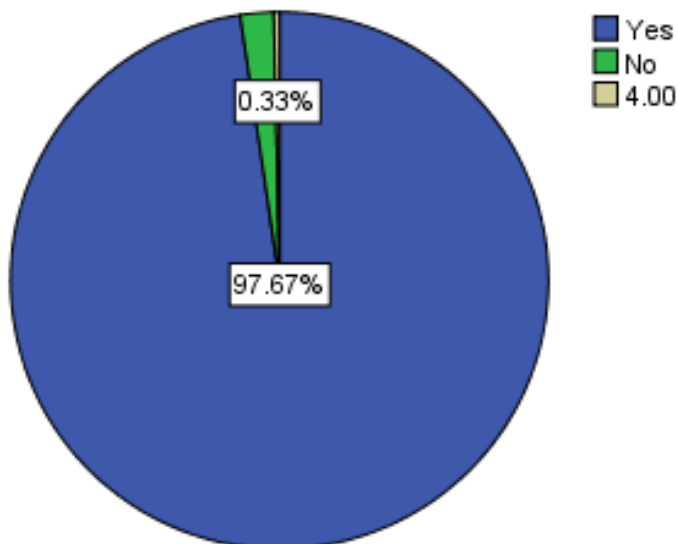
**Question 6:** This research question is to know the feelings of the residents of Jalalabad city about pollution. So, the researcher asked the respondent, "How do you feel about the pollution in Jalalabad city?"

**Have you ever felt the atmosphere polluted in Jalalabad city?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	293	97.7	97.7	97.7
No	6	2.0	2.0	99.7
4.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 6: This table describes the air pollution in Jalalabad city

**Have you ever feel the atmosphere polluted in JLB?**



Graph 6: This graph analysis the air pollution in Jalalabad city.

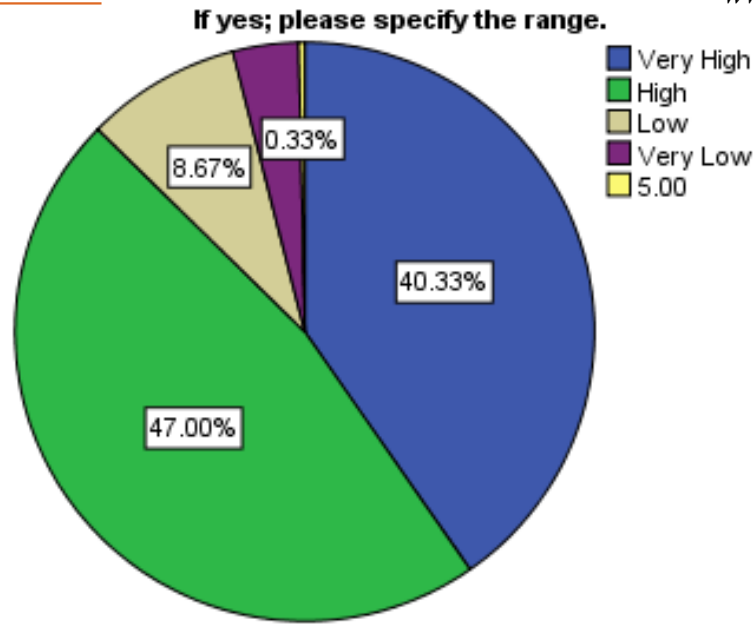
In response to this question, 97.7 percent of the respondents answered yes. 2 percent of the respondents answered no, and 0.3 percent of the respondents did not answer the question. The analysis has shown that the citizens have felt the high level of air pollution, and it is clear that they will face various kinds of damage due to it. The information and analysis will be presented in other questions.

**Question 7:** This research question is to know what citizens think about the level of air pollution in Jalalabad city?

**If yes; please specify the range.**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Very High	121	40.3	40.3	40.3
High	141	47.0	47.0	87.3
Low	26	8.7	8.7	96.0
Very Low	11	3.7	3.7	99.7
5.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 7: This table describes the level of air pollution in Jalalabad city



Graph 7: This graph analysis the amount or degree of air pollution in Jalalabad city.

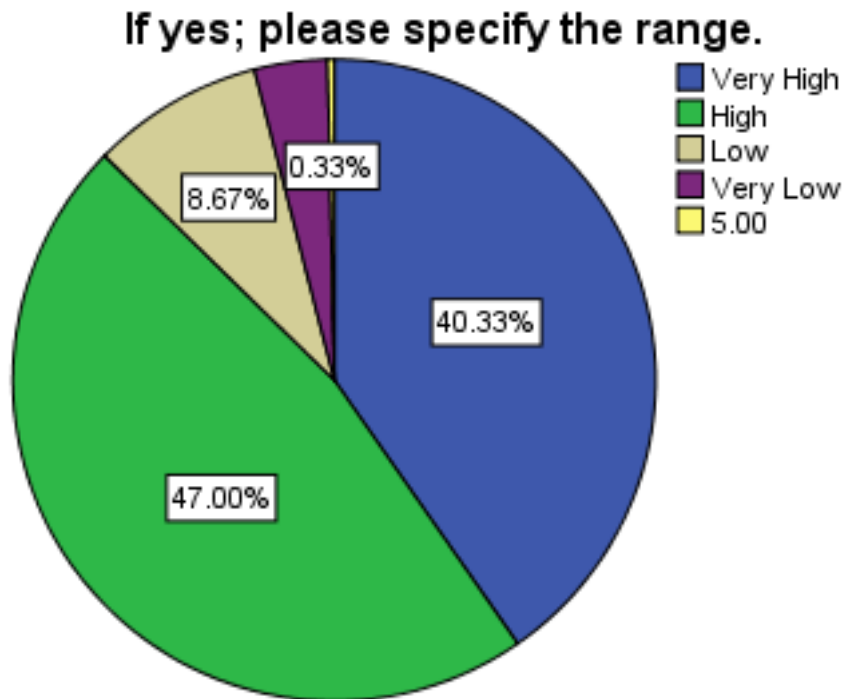
Various responses have been received from the people interviewed about the level of air pollution in Jalalabad city. (40.3%) people said that the air pollution in Jalalabad city is very high. (47%) people have said that it is high. 8.7% of people said that it is less, and (3.7%) of the respondents said that it is very less. So, the information from these numbers shows that there is a high chance that the air pollution in Jalalabad city is high.

**Question 8:** This research question is asked from the participants that which area of Jalalabad city has the most air pollution?

**In your opinion; which sector of Jalalabad highly Air polluted?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	1	.3	.3	.3
Sector 01	86	28.7	28.7	29.0
Sector 02	33	11.0	11.0	40.0
Sector 03	59	19.7	19.7	59.7
Sector 04	38	12.7	12.7	72.3
Sector 05	15	5.0	5.0	77.3
Sector 06	8	2.7	2.7	80.0
Sector 07	19	6.3	6.3	86.3
Sector 08	11	3.7	3.7	90.0
9.00	30	10.0	10.0	100.0
Total	300	100.0	100.0	

Table 8: This table describes the polluted areas in Jalalabad city



Graph 8: This graph analysis the polluted areas in Jalalabad city

(28.7)percent of the respondents said that the air pollution is high in phases 1. (11.0) percent of the respondents said that in phase 2. (19.1) percent of the respondents said that phase 3. (12.7%) percent of the respondents said that in phase 4. (5.0) percent of the respondents said that in phase 5. (2.7) said that phase 6. (6.3) percent of the respondents said that phase 7, and (3.7) percent of the respondents said that the air pollution is high in phase 8. 9 people among did not did not answer the question.

Answers about of the highest percentage of air pollution were obtained in phases 1 and 3 of Jalalabad city, which helps to be closer to the truth; because these are very urban and crowded areas, where there is more traffic, hotels, baths, etc. than others.

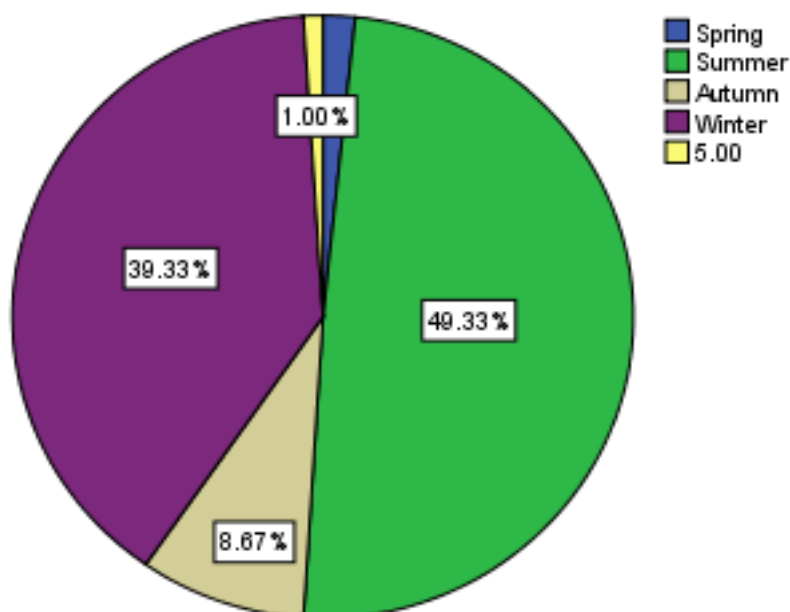
**Question 9:** This research question is asked from the participants that which season causes high air pollution in Jalalabad city?

**In your opinion, which season caused high Air Pollution in Jalalabad city?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Spring	5	1.7	1.7	1.7
Summer	148	49.3	49.3	51.0
Autumn	26	8.7	8.7	59.7
Winter	118	39.3	39.3	99.0
5.00	3	1.0	1.0	100.0
Total	300	100.0	100.0	

Table 9: This table describes the seasons that cause high air pollution in Jalalabad city

**In your opinion, which season caused high Air Pollution in JLB?**



Graph 9: This graph analysis seasons that cause the high air pollution in Jalalabad city

(1.7%) of the respondents said that air pollution is high in the spring. (49.3%) of the respondents said that air pollution is high in summer. (8.7%) of the respondents said in the autumn season. (39.3%) of the respondents said that air pollution is high in the winter season, and (1%) of the respondents did not answer this question.

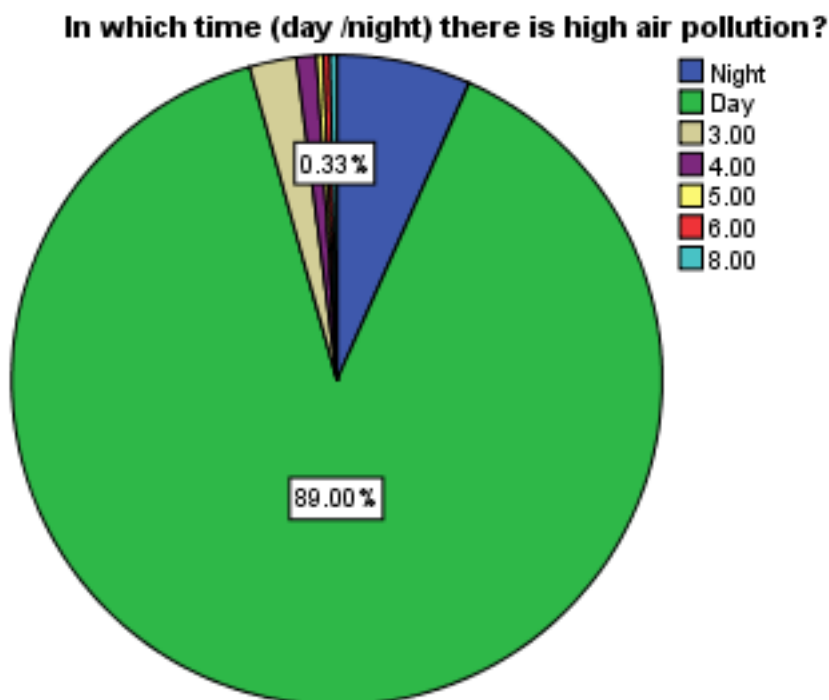
The information obtained from the answer to this question, the details of which will be presented in other questions, shows that there is high air pollution in Jalalabad city during the two seasons of the year, summer and winter. Because people use diesel power machines that produce much pollution.

**Question 10:** In this research question, the participants were asked at which time of day or night the air pollution was getting high.

**In which time (day /night) there is high air pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Night	20	6.7	6.7	6.7
Day	267	89.0	89.0	95.7
3.00	7	2.3	2.3	98.0
4.00	3	1.0	1.0	99.0
5.00	1	.3	.3	99.3
6.00	1	.3	.3	99.7
8.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 10: This table describes the air pollution both in day and night times



Graph 10: This graph analysis the air pollution level both in day and night times

From the analysis of the responses, it is shown that the percentage of air pollution is higher during the day. 6.7% of the respondents said that air pollution is high at night, but (89%) people said that air pollution is high during the day because the activities of each section flow normally during the day time. (4.3%) respondents did not answer this question.

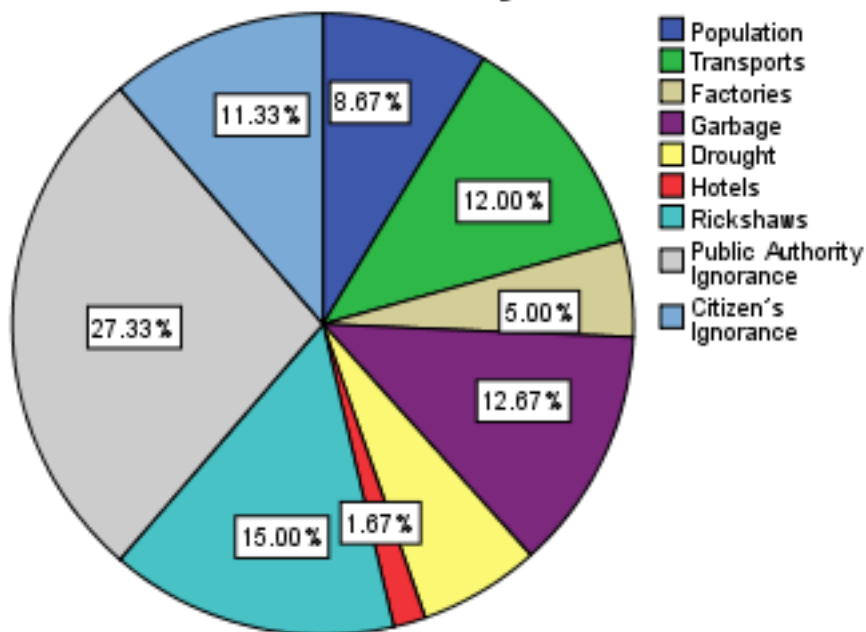
**Question 11:** In this research question, the participants were asked about the main causes of the air pollution in Jalalabad city.

**In your opinion, what are the reasons behind air pollution in Jalalabad city?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Population	26	8.7	8.7	8.7
Transports	36	12.0	12.0	20.7
Factories	15	5.0	5.0	25.7
Garbage	38	12.7	12.7	38.3
Drought	19	6.3	6.3	44.7
Hotels	5	1.7	1.7	46.3
Rickshaws	45	15.0	15.0	61.3
Public Authority Ignorance	82	27.3	27.3	88.7
Citizen's Ignorance	34	11.3	11.3	100.0
Total	300	100.0	100.0	

Table 11: This table describes the main causes of the air pollution in Jalalabad city

**In your opinion, what are the reasons behind air pollution in Jalalabad city?**



Graph 11: This graph analysis the main causes of the air pollution in Jalalabad city. There are various and different opinions in this regard, among the respondents. (8.7%) percent of the respondents said that population increase has caused air pollution. (12%) percent of the respondents said transportation system caused air pollution. (5%) percent of the respondents said factories. (12.7%) percent of the respondents said garbage. (6.3%) percent of the respondents said drought. (1.7%) percent said hotels. (15%) percent of the respondents said

rickshaws. (27.3%) percent of the respondents said neglect of responsible agencies. (11.3%) said that lack of public attention is the main cause of air pollution.

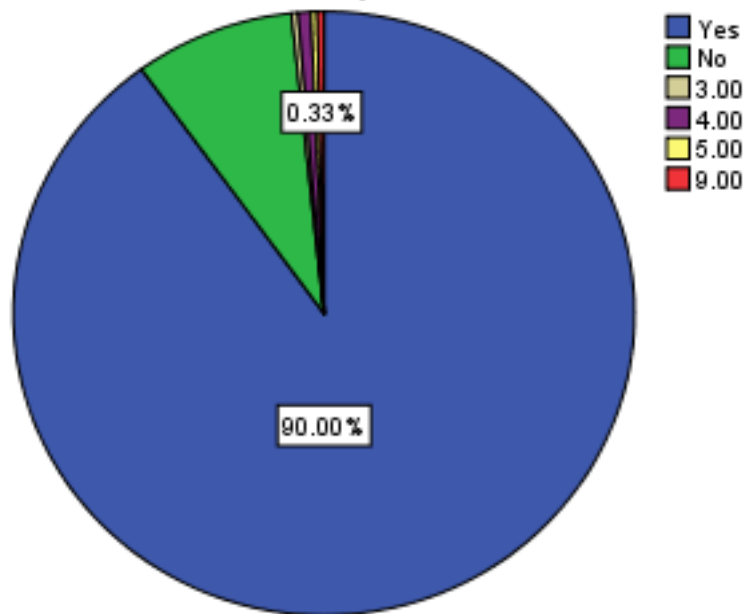
**Question 12:** In this research question is asked from the participants that how the non-observance of urban culture can affect the environment and air pollution?

**whether the non-observance of urban culture affect air pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	270	90.0	90.0	90.0
No	25	8.3	8.3	98.3
3.00	1	.3	.3	98.7
4.00	2	.7	.7	99.3
5.00	1	.3	.3	99.7
9.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 12: This table describes the effects of non-observance of the urban culture.

**whether there is ignorance to urban traditions cause air pollution?**



Graph 12: This graph analysis the effects of non-observance of the urban culture. From the analysis of the responses of the respondents, it has been revealed that the non-compliance with urban culture can have (90%) negative impact both on the environmental pollution and air pollution. Most of the problems mentioned will be solved if citizens pay attention to urban culture on a regular and accurate basis.

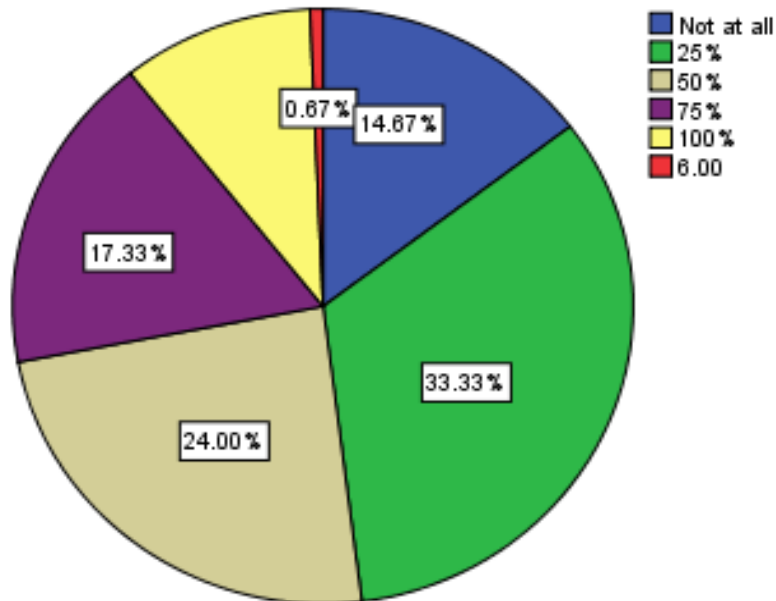
**Question 13:** This research question asked shopkeepers and cart owners that how much the activities of shopkeepers and cart owners cause the air pollution?

**How much Cart Owners cause air pollution in Jalalabad?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Not at all	44	14.7	14.7	14.7
25%	100	33.3	33.3	48.0
50%	72	24.0	24.0	72.0
75%	52	17.3	17.3	89.3
100%	30	10.0	10.0	99.3
6.00	2	.7	.7	100.0
Total	300	100.0	100.0	

Table 13: This table describes the effects of shopkeepers and cart owners activities on air pollution.

**How much Cart Owners cause air pollution in Jalalabad?**



Graph 13: This graph analysis the effects of shopkeepers and cart owners' activities on air pollution.

(14.7%)percent of the respondents said that the activities of shopkeepers and cart owners have no effect on air pollution. (33.3%) percent of the respondents said it has 25% effect. (24%) percent of the respondents said it has 50% effect. (17.3%) percent of the respondents said it has 75 percent effect. (10%) percent of the respondents said it has 100% effect, and (7%) percent of the respondents did not answer this question.

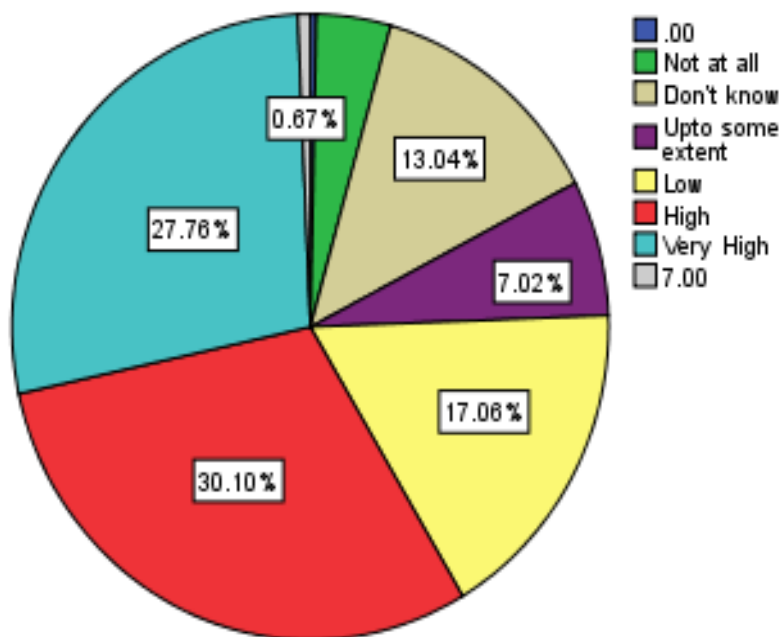
**Question 14:** In this question, the participants were asked the participants whether the presence of old vehicles has an effect on the increase of air pollution?

**Do Old means of transportation caused air pollution in Jalalabad?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1	.3	.3	.3
	Not at all	12	4.0	4.0	4.3
	Don't know	39	13.0	13.0	17.4
	up to some extent	21	7.0	7.0	24.4
	Low	51	17.0	17.1	41.5
	High	90	30.0	30.1	71.6
	Very High	83	27.7	27.8	99.3
	7.00	2	.7	.7	100.0
	Total	299	99.7	100.0	
Missing	System	1	.3		
Total		300	100.0		

Table 14: This table describes the effects of transportation system on the air pollution

**Do Old methods of transportation caused air pollution in Jalalabad?**



Graph 14: This graph analysis the effects of old transportation on the air pollution

(4%)percent of the respondents said that old vehicles have no effects on air pollution. (7%) percent of the respondents said it has some sort of effects. (17.1%) percent of the respondents said less effects. (30.1) percent said of the respondents more effects. (27.8%) percent of the respondents said it has more effects, and (3%) percent said they don't know.

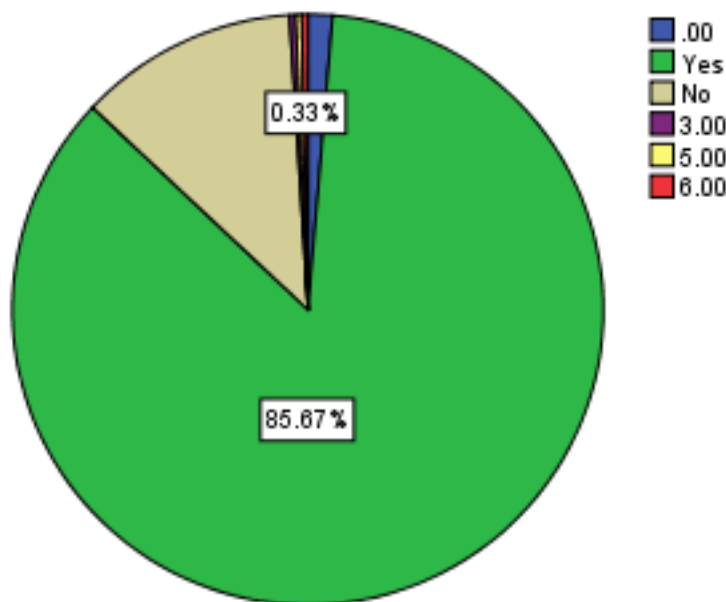
**Question 15:** In the research question, the respondents were asked about the effects of the lack of canalization system or the air pollution?

**Do you think, the lack of canalization caused air pollution in Jalalabad city?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	4	1.3	1.3	1.3
Yes	257	85.7	85.7	87.0
No	36	12.0	12.0	99.0
3.00	1	.3	.3	99.3
5.00	1	.3	.3	99.7
6.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 15: This table describes the effects of the lack of canalization system on the air pollution

**Do you think, the lack of canalization caused air pollution in JLB?**



Graph 15: This graph analysis the effects of the lack of canalization system on the air pollution

(85.7%) percent of the respondents said that the lack of canalization system of dirty and excess water in Jalalabad city is one of the main causes of air pollution. Because this dirty water flows on the earth and then dries up and creates air pollution. 12% of the respondents said that the presence of sewerage has no effect on air pollution.

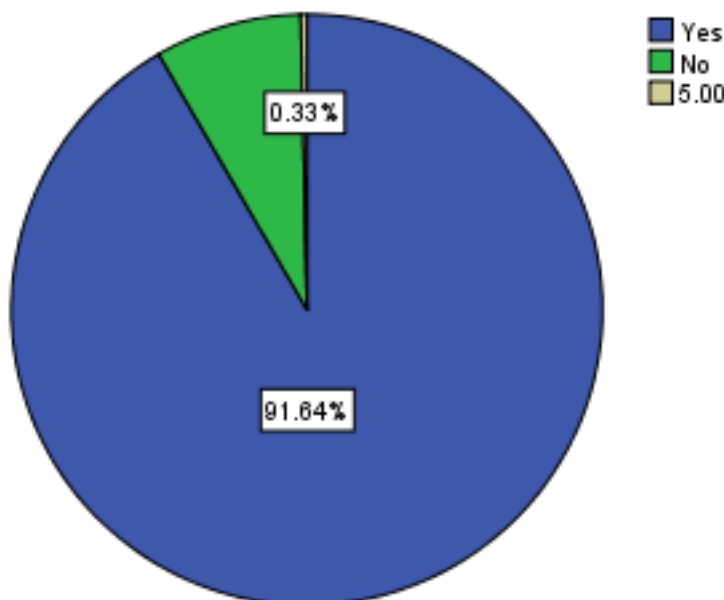
**Question 16:** In this research question, the respondents were asked the effects of the unavailability of green areas on the air pollution in Jalalabad city?

**Whether non availability of green areas in Jalalabad city cause air pollution?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	274	91.3	91.6	91.6
	No	24	8.0	8.0	99.7
	5.00	1	.3	.3	100.0
	Total	299	99.7	100.0	
Missing	System	1	.3		
Total		300	100.0		

Table 16: This table describes the effects of unavailability of green areas in Jalalabad city

**.Whether non availability of meadows in Jalalabad city caused air pollution?**



From the analysis of the answers and information of the respondents, it was revealed that the presence of green areas can play (91%) role in preventing air pollution. This means that the absence of green areas is one of the most serious issues, and has a great negative impact on the air pollution.

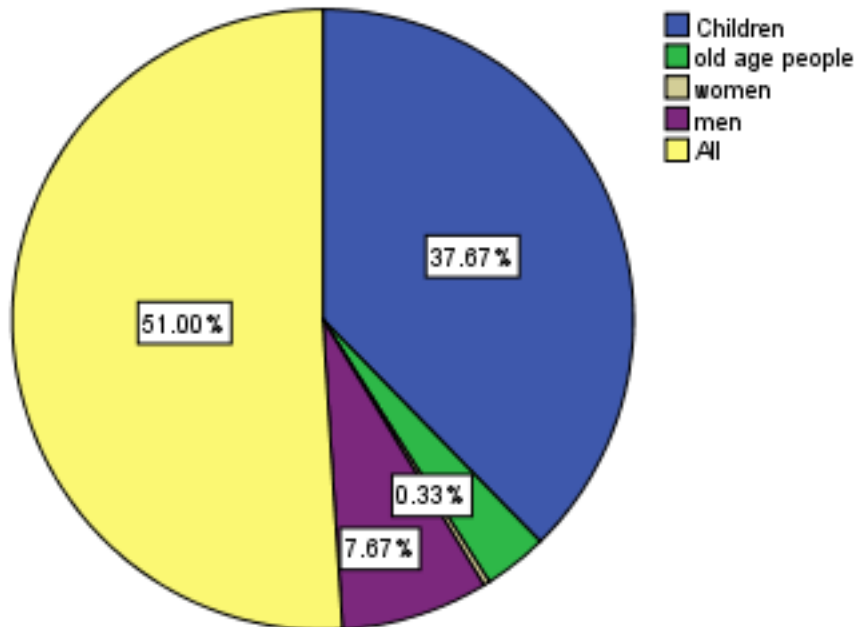
**Question 17:** In this research question, the respondents were asked that which class of people is more affected by the air pollution?

**In your opinion, which age range mostly effected by Air Pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Children	113	37.7	37.7	37.7
old age people	10	3.3	3.3	41.0
women	1	.3	.3	41.3
men	23	7.7	7.7	49.0
All	153	51.0	51.0	100.0
Total	300	100.0	100.0	

Table 17: This table describes the class of people who are mostly affected by the air pollution

**In your opinion, which age range mostly effected by Air Pollution?**



Graph 17: This graph analysis the class of people who are mostly affected by the air pollution

Since people of different ages live in the society and in the case of air pollution, all of them can be affected in one way or another. (37.7) percent of the respondents said that children are affected by air pollution. (3.3%) percent of the respondents said that it has a negative effect on the over aged. (0.3%) percent of the respondents said that only women are affected by it. (7.7%) percent of the respondents said that men are affected by it, and the rest (51%) percent of the respondents said that it affects everyone equally. From here it can be said that all classes of the society are affected by the negative effects of air pollution.

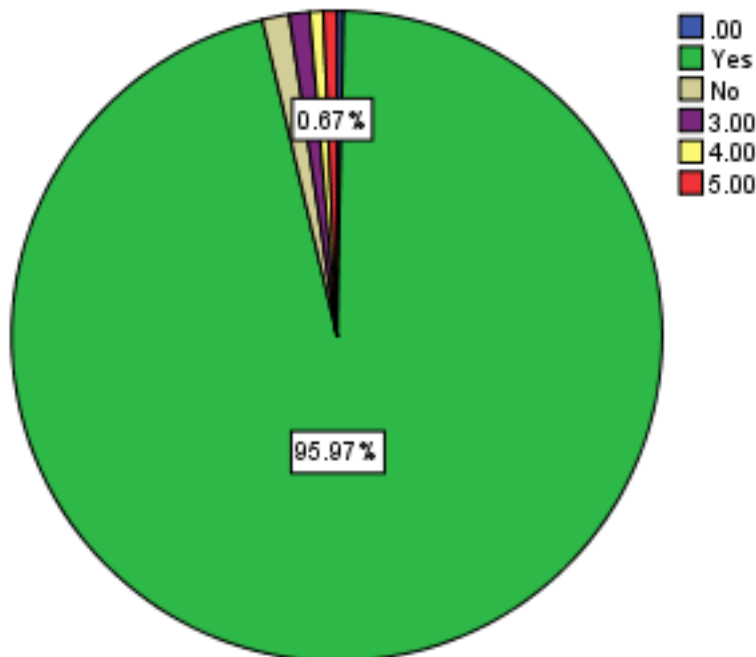
**Question 18:** In this research question, the respondents were asked that how many people got sick due to the polluted air?

**Do you think that due to air pollution people became sick?**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	.00	1	.3	.3	.3
	Yes	286	95.3	96.0	96.3
	No	4	1.3	1.3	97.7
	3.00	3	1.0	1.0	98.7
	4.00	2	.7	.7	99.3
	5.00	2	.7	.7	100.0
	Total	298	99.3	100.0	
Missing	System	2	.7		
Total		300	100.0		

Table 18: This table describes the effects of polluted air on people’s health

**Do you think that due to air pollution people became sick?**



Graph 18: This graph analysis the effects of polluted air on people’s health

(95.3%) of the respondents said that they got sick due to polluted air and only (1.3%) of the respondents said that they did not get sick due to polluted air.

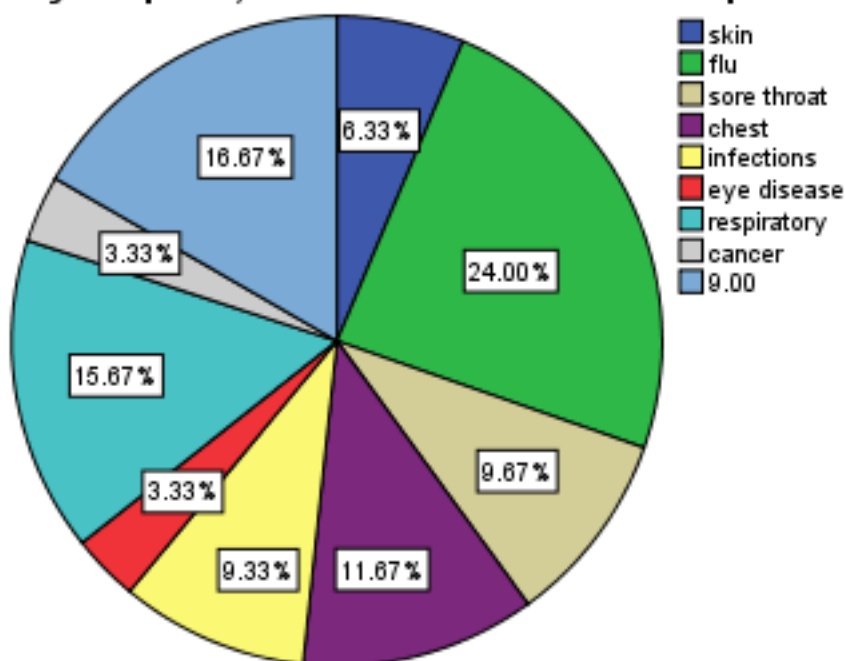
**Question 19:** In this research question, people were asked about the kinds of diseases that cause the air pollution?

**In your opinion, what kind of diseases cause air pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid skin	19	6.3	6.3	6.3
flu	72	24.0	24.0	30.3
sore throat	29	9.7	9.7	40.0
chest	35	11.7	11.7	51.7
infections	28	9.3	9.3	61.0
eye disease	10	3.3	3.3	64.3
respiratory	47	15.7	15.7	80.0
cancer	10	3.3	3.3	83.3
9.00	50	16.7	16.7	100.0
Total	300	100.0	100.0	

Table 19: This table describes the kinds of diseases caused by the air pollution

**In your opinion, what kind of diseases cause air pollution?**



Graph 19: This graph analysis the kinds of diseases caused by the air pollution

6.33 percent of the respondents said air pollution causes skin disease. 24 percent of the respondents said air pollution causes flu. 9.67 percent of the respondents said air pollution causes sore throat. 11.67 of the respondents said air pollution causes chest problem. 9.33 percent of the respondents said air pollution causes infections. 3.33 percent of the respondents said air pollution causes eye disease. 15.67 percent of the respondents said air pollution causes respiratory disease, and 3.33 percent of the respondents said air pollution causes cancer.

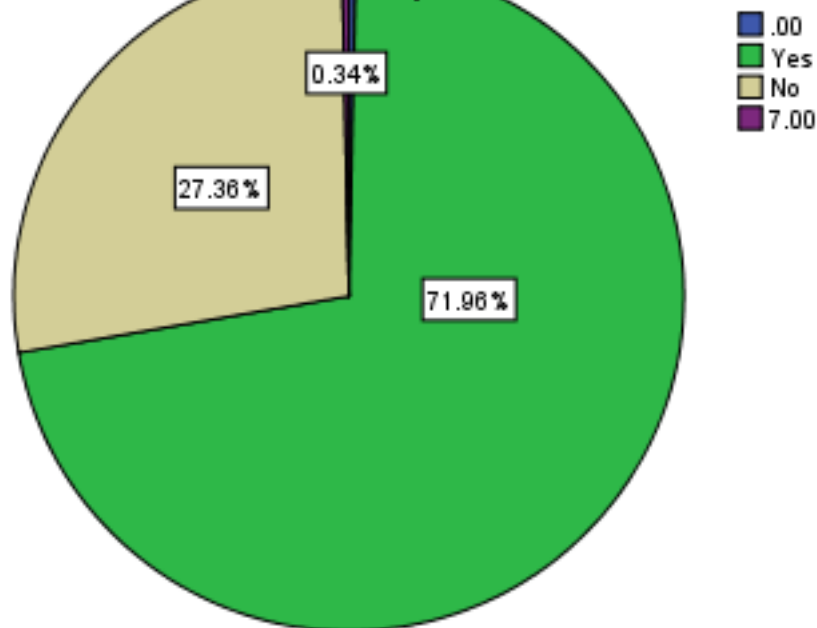
**Question 20:** In this research question, the people were asked whether they use masks to protect themselves of the air pollution?

**Do you use mask to protect yourself from harmful effects of air pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	1	.3	.3	.3
Yes	213	71.0	72.0	72.3
No	81	27.0	27.4	99.7
7.00	1	.3	.3	100.0
Total	296	98.7	100.0	
Missing System	4	1.3		
Total	300	100.0		

Table 20: This table describes the usage of mask

**Do you use mask to protect yourself from harmful effects of air pollution?**



**Question 21:** In this research question, the people were asked that which organization they consider responsible for preventing air pollution.

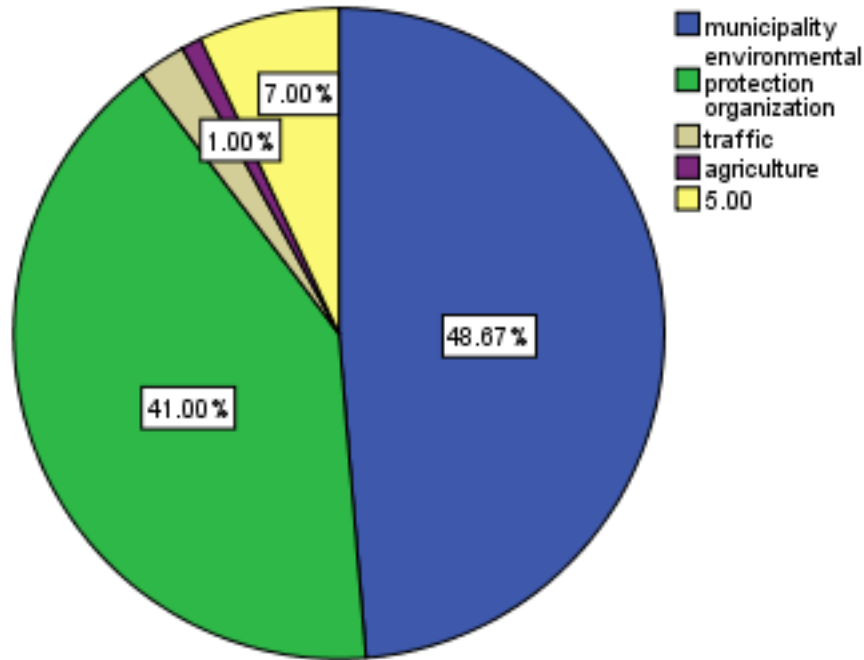
**Who is being responsible for Environmental Air Pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid municipality	146	48.7	48.7	48.7
environmental protection organization	123	41.0	41.0	89.7
traffic	7	2.3	2.3	92.0
agriculture	3	1.0	1.0	93.0

5.00	21	7.0	7.0	100.0
Total	300	100.0	100.0	

Table 21: This table describes the responsible agencies for preventing air pollution

**Who is being responsible for Environmental Air Pollution?**



Graph 21: This graph analysis the responsible agencies for preventing air pollution

Regarding which government body is responsible for environmental protection, we received different answers from the participants. Regarding which government body is responsible for environmental protection, we received different answers from the participants. (48.7%) percent of the respondents believe that the municipality should focus on this issue. (41%) of the respondents said that the Environmental Protection Agency should pay attention to this matter. (2.3%) percent of the respondents considered the traffic department responsible, and (1%) percent of the respondents said the Department of Agriculture is responsible.

**Question 22:** Since there is a special agency for environmental protection; the research wants to know how well this organization is functioning and how much people are aware and agree with the its activities.

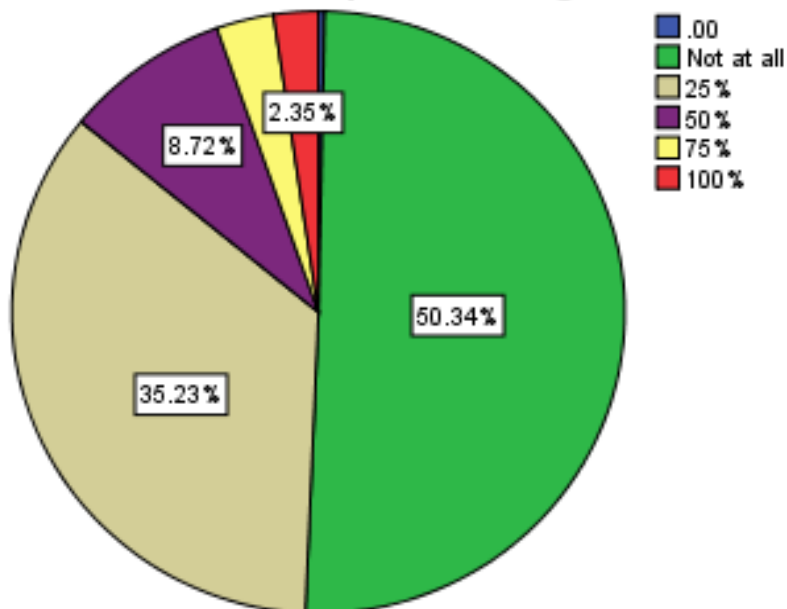
**How much you are aware and agree with the activities of environmental protections organization?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	1	.3	.3	.3
Not at all	150	50.0	50.3	50.7

25%	105	35.0	35.2	85.9
50%	26	8.7	8.7	94.6
75%	9	3.0	3.0	97.7
100%	7	2.3	2.3	100.0
Total	298	99.3	100.0	
Missing System	2	.7		
Total	300	100.0		

Table 22: This table describes the performance and satisfaction of the environmental

**How much you are aware and agree with the activities of environmental protections organization?**



Graph 22: This graph analysis the performance and satisfaction of the environmental protection agency

In response to this question, 50.34% of the respondents expressed dissatisfaction and said that the agency did not perform its functions well. (35.23) percent of the respondents are 25 percent satisfied with the activities of this agency. (8.72) percent of the respondents are 50 percent satisfied. (2.5) percent of the respondents are 75 percent satisfied. (2.3%) respondents of the respondents expressed 100 percent satisfaction with the activities of the Environmental Protection Agency.

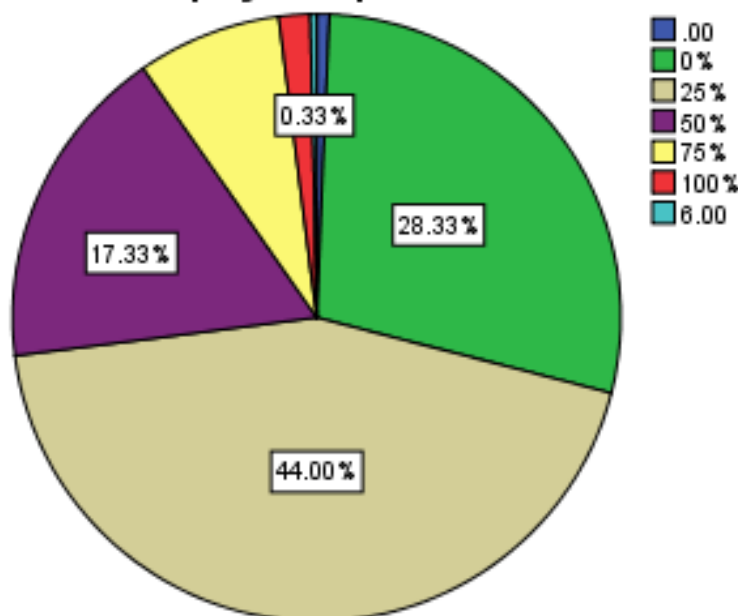
**Question 23:** In this research question, the people were asked about the activities of Jalalabad Municipality in the field of environmental protection.

**How much you are agree with the activities done by the Municipality in the protection of Air Pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid .00	2	.7	.7	.7
0%	85	28.3	28.3	29.0
25%	132	44.0	44.0	73.0
50%	52	17.3	17.3	90.3
75%	23	7.7	7.7	98.0
100%	5	1.7	1.7	99.7
6.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 23: This table describes the satisfaction level of the people about the activities of Jalalabad municipality in the field of environmental protection.

**How much you are agree with the activities done by the Municipality in the protection of Air Pollution?**



Graph 23: This graph analysis the satisfaction level of the people about the activities of Jalalabad municipality in the field of environmental protection.

(28%)percent of the respondents said that they do not have any kind of satisfaction. (44%) percent of the respondents said that they are very less satisfied. (17.3%) percent of the respondents said they are (50%) percent satisfied. Only (9.4%) percent of the respondents expressed their complete satisfaction with the activities of Jalalabad Municipality. The analysis

shows that the citizens are satisfied that the relevant agencies have not done their work well in terms of environmental protection.

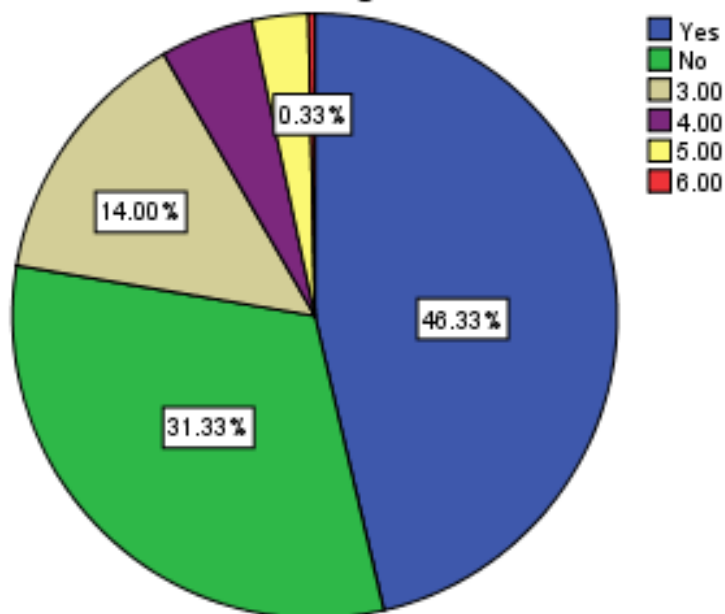
**Question 24:** In this research question, people were asked about the existed laws regarding environment protection in Afghanistan.

**Is there any law regarding environmental protection in Afghanistan?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid Yes	139	46.3	46.3	46.3
No	94	31.3	31.3	77.7
3.00	42	14.0	14.0	91.7
4.00	15	5.0	5.0	96.7
5.00	9	3.0	3.0	99.7
6.00	1	.3	.3	100.0
Total	300	100.0	100.0	

Table 24: This table describes the level of perception about the existed laws regarding

**Is there any law regarding environmental protection in Afghanistan?**



Graph 24: This graph analysis the level of perception about the existed laws regarding environmental protection in Afghanistan

(31.33%)percent of the respondents said that they do not have information. Some of the others did not answer and some of them missed this question. According to the analysis, more than

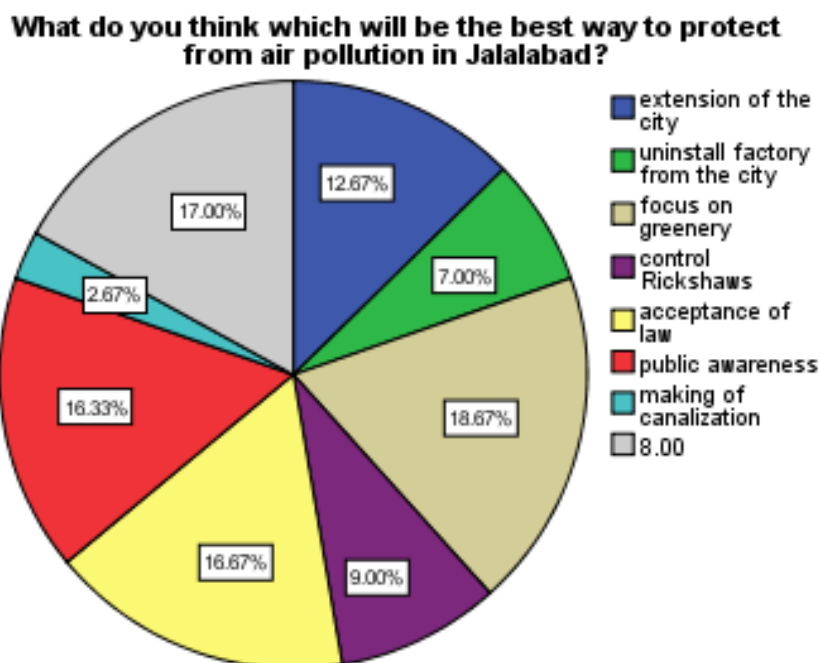
half of the people still do not have information about the environmental protection law, which unfortunately increases the problems facing the environment due to this gap.

**Question 25:** In this research question, the people were asked about the ways of prevention of the air pollution.

**What do you think which will be the best way to protect from air pollution in Jalalabad?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid extension of the city	38	12.7	12.7	12.7
uninstall factory from the city	21	7.0	7.0	19.7
focus on greenery	56	18.7	18.7	38.3
control Rickshaws	27	9.0	9.0	47.3
acceptance of law	50	16.7	16.7	64.0
public awareness	49	16.3	16.3	80.3
making of canalization	8	2.7	2.7	83.0
8.00	51	17.0	17.0	100.0
Total	300	100.0	100.0	

Table 25: This table describes the prevention ways of the air pollution



Graph 25: This graph analysis the prevention ways of the air pollution (12.67%) percent of the respondents said that air pollution can be prevented with the urban development program of Jalalabad city. Because the factories will be established far away from the city and the city will be less crowded with all the development. 7% of people mentioned

this issue and requested that the factories had better remove from the center of the city. (18.67%) percent of the respondents said that the increasing of green areas can reduce the level of air pollution. (9%) of the respondents have said that the number of vehicles should be controlled in the city and a plan should be made to reduce the number, especially the number of rickshaws. From the research participants (16.67%) A majority of people emphasized the implementation of the law and called it a solution for environmental protection. (16.33%) percent of the respondents said that public awareness is the solution to prevent environmental pollution. (2.67%) percent of the respondents said that the construction of sewerage for Jalalabad city is a solution to prevent environmental pollution.

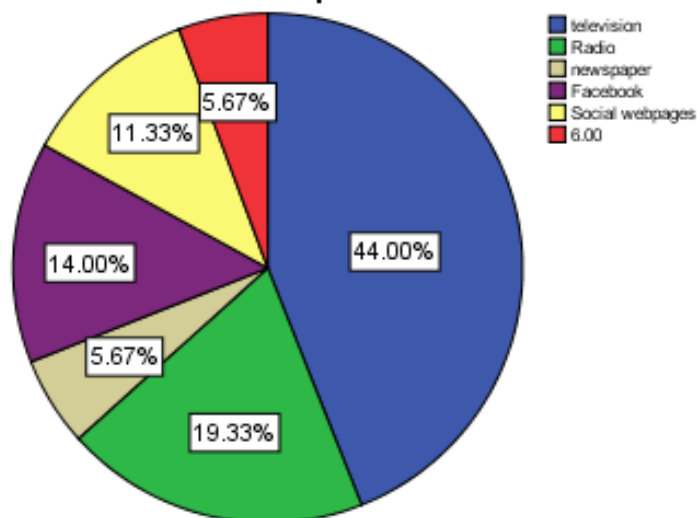
**Question 26:** In this research question, the people were asked about the effective ways of public awareness and the information obtained as follows.

**what are the best way for public awareness to protect from air pollution?**

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid television	132	44.0	44.0	44.0
Radio	58	19.3	19.3	63.3
newspaper	17	5.7	5.7	69.0
Facebook	42	14.0	14.0	83.0
Social webpages	34	11.3	11.3	94.3
6.00	17	5.7	5.7	100.0
Total	300	100.0	100.0	

Table 26: This table describes the methods of public awareness in protection of air pollution

**what are the best way for public awareness to protect from air pollution?**



Graph 26: This graph analysis the methods of public awareness in protection of air pollution

44% percent of the respondents said that the best way to aware and educate the public about environmental protection is through television. (19.33%) percent of the respondents said that public awareness campaigns through radio are effective. (5.67%) of the respondents said public awareness through newspaper is effective. (14%) of the respondents said that public awareness can be better through Facebook. (11.33%) of the respondents said the best way of public awareness is through different social networks, and (5.67%) did not answer this question.

### **Conclusion**

As a result of the research, I came to the conclusion that the air in Jalalabad city is polluted and the level of pollution is higher than the normal situation, due to which the normal life of the citizens has also faced problems. According to the data analysis, the citizens have been suffering from various diseases due to air pollution in Jalalabad city, including colds, sore throats, eye pains, chest diseases, allergies, respiratory problems, and other sorts of diseases. Moreover, we found in the research that the main factors contributing to air pollution in Jalalabad city are the existence of an irregular transportation system, the presence of old vehicles and rickshaws, the existence of factories in Jalalabad city, the abundance of garbage, and the lack of a regular sewerage system for the city of Jalalabad.

Furthermore, another cause of the air pollution is the lack of attention of the responsible agencies to their related responsibilities, especially the National Environmental Protection Agency and the Jalalabad Municipality, has been shown to be the cause of air pollution. Besides, due to wars and other reasons, the coming of families from rural areas to the city and generally the nonobservance of the urban culture by the citizens have been mentioned among the causes of environmental pollution, especially air pollution. Moreover, we found that effective ways to prevent air pollution in Jalalabad city are the removal of factories from the city, creation of green areas, urban development programs, transportation control, attention to canalization, and public awareness. As well as, conducting public awareness about environmental protection through various media and seriously working to implement the law have been shown as ways to prevent environmental pollution, especially air pollution.

### **Recommendations**

In order to complete the incomplete parts of this research and to implement the obtained results, I would like to present some of my recommendations as follows.

#### **A. To the National Environment Agency**

1. It is suggested to the National Environmental Protection Agency that by attracting the cooperation of the mass media, educational institutions, and various communities, they create various public awareness plans and programs for the people of the community about environmental protection.
2. In order to solve the problems related to the environment, the Environmental Protection Agency should establish coordination with the community and the agencies responsible for the implementation of the law regarding environmental protection.

#### **B. To the Jalalabad municipality**

1. Jalalabad Municipality is recommended to work for the development and construction of green areas in different parts of the city, both on private and government lands.
2. In order to get rid of the dirty water overflows on the roads, the municipality of Jalalabad is recommended to prepare a plan and take positive steps to work on the sewerage system of Jalalabad.

**C. To the department of public health**

1. It is suggested that the Honorable Department of Public Health to prevent all those activities that cause air pollution in Jalalabad city.
2. On the basis of research, the respected Department of Public Health should figure out the level of air pollution in Jalalabad city and the factors that change the real state of the air, as well as ways to stop it.

**D. To the universities and educational centers**

1. It is suggested that universities and educational institutions create plans and programs based on quality assurance standards of the Ministry of Higher Education to prevent environmental pollution and specially to organize public awareness conferences and seminars.
2. It is recommended that universities and educational centers conduct research on soil and water pollution with the contributions of their academic staff and students.

**E. To the university professors and researchers**

1. It is recommended that university professors and researchers expand this research so that the same cases of air pollution can be explored and investigated at the district level and at the level of Nangarhar province as a whole.
2. It is suggested that the professors and doctors of the Faculty of Medicine conduct special research on every disease caused by air pollution in Jalalabad city and determine the factors and solutions.

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