Journal of Air Pollution and Health (Autumn 2018); 3(4): 225-234

Original Article

Available online at http://japh.tums.ac.ir

Survey of knowledge and attitude of people about air pollution in Tehran, Iran

Ali Ahmadfazeli[1], Zohreh Hesami[2], Ali Ghanbari[3], Mohammad Safari[1], Mohammad Sadegh Hassanvand[4,]*

[1] Department of Environmental Health Engineering, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
[2] Environment and Sustainable Development, Department of Tehran Municipality, Tehran, Iran
[3] Department of Epidemiology and Biostatistics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran
[4] Center for Air Pollution Research (CAPR), Institute for Environmental Research (IER), Tehran University of Medical Sciences, Tehran, Iran

ARTICLE INFORMATION

Article Chronology:
Received 15 October 2018
Revised 10 November 2018
Accepted 11 December 2018
Published 30 December 2018

Keywords:
Air pollution; Knowledge; Attitude; Strategies; Training

CORRESPONDING AUTHOR:

hassanvand@sina.tums.ac.ir
Tel: (+98 21) 88954914
Fax: (+98 21) 88950188

ABSTRACT:

Introduction: The importance of air quality and paying attention to what we breathe have been valuable always. So that air pollution is one of the key environmental issues in urban communities. Several studies show that the potential effects of air pollution on human health include increased mortality and changes in cardiovascular and respiratory functions.

Materials and methods: The population of this study was people in 22 districts of Tehran megacity. The questionnaires were placed at the municipality centers of 22 districts and randomly completed by people who came to the center. Questions included the importance of air pollution, the comparison of air quality with last year, the main sources of air pollution, the problems created by air pollution, the quality of informing system, as well as questions about their satisfaction about government's actions on air pollution control plans. Data analysis was performed using SPSS 24.

Results: 84.14 % of the participants stated that air pollution is important to them and has a negative influence on their lives. Also, most of them were not satisfied with the measures taken and expected that actions would be better to reduce air pollution. 91.10 % of the participants considered cars as the main causes of air pollution. Also, 68.22 % of people believed that air pollution had a significant negative impact on their quality of life.

Conclusion: Most people are willing to live at a higher cost but a less polluted environment, while more of them are not well aware of their role in reducing air pollution. Moreover further education should be provided on the role of people in reducing air pollution. Additionally, the government must deal with air pollutants and take serious measures.

Introduction

Approximately three hundred years ago, air pollution began in urban districts concurrent with the industrial revolution. Its magnitude and intensity increased with the rising population in cities as well as the development of the industry growth. Detrimental products in the air are created by the use of fossil fuels such as oil, coal, and gas, consequently the release of air from their combustion [1]. The importance of clean air and paying attention to what we breathe have been valuable always. So that air pollution is one of the key

Please cite this article as: Ahmadfazeli A, Hesami Z, Ghanbari A, Safari M, Hassanvand M.S. Survey of knowledge and attitude of people about air pollution in Tehran, Iran. Journal of Air Pollution and Health. 2018; 3(4):225-234.

environmental issues in urban communities. Numerous studies show that the potential effects of air pollution on human health include increased mortality and changes in cardiovascular and respiratory function. Furthermore, bad mood, depression, anger, anxiety, stress and memory loss can be added to air pollution complications [2, 3]. Outdoor air pollution has many adverse effects, some of which are due to short-term exposure and others due to long-term, and one of the causes of disease and mortality [4]. Some cities in Iran are considered as polluted cities, among them, Tehran is considered to be a populous and large city because it is a mega city with more than 4 million vehicles. Regarding this, in addition to being populous, it is also crowded that makes further air pollution in Tehran. The reason for this can be understood the specific geographic situation and traffic in Tehran [5]. There have been many studies about air pollution in different countries. Some researchers, in a study analyzed the relationship between air pollution and respiratory illnesses [6]. The cars have been called as the leading sources of air pollution in Tehran. The issue of Tehran's air pollution and its dangers has been reminded out to in different forms [7]. Exposure to air pollution can create acute and chronic health consequences that in the 20th century, when the severe air pollution in Europe (Meuse Valley and London) and in the United States (Donora, Pa) created thousands of deaths and disease, the acute impacts of it on the human were confirmed [8,9]. Furthermore, despite the significant decline of it due to the combustion of fuels, emerging pollutants like O_3 and NO_X have turned crucial in the health outcomes of air pollution [10, 11]

The issue of environmental pollution has become a crisis over the past years, and it is getting worse. Moreover, since most of these pollutants are caused by human, today further attention is paid to the social sciences [12]. Consequently, the study of the awareness, attitude and practice of various social groups about environmental pollution, and in particular air pollution, has been considered recently, and has proved that with increasing air pollution, the emotional response is generated in people. As far as, people tend to pay much to decrease air pollution [13]. On the other hand, people may feel that due to the severity and extent of air pollution, their performance has a short-term and low influence in reducing air pollution. Because of this feeling about their lack impact on environmental issues, they may be discouraged from participating in problem-solving [14]. Many researchers, in their research revealed that students are concerned about the issue of air pollution, on the other words, have a good understanding of the risk. But it seems that the measures taken to reduce the air pollution dilemma are not acceptable to the students [15]. Now, it's clear that promoting people's attitudes towards air pollution will improve people's performance. It also increases the people's demands from authorities to deal with air pollution. The attitude of humans, especially young people, in relation to the environment and its destruction factors, changes their lifestyles and decisions about the future. Eventually, human decisions and behaviors in relation to the environment cause to preserve or destroy the environment [16]. Since comprehensive study on the attitude, perception, and recommendations of Tehran's people towards air pollution has not been carried out, the preparation and implementation of comprehensive air pollution reduction programs require the involvement of people. It is hoped that the results of this study will assist the authorities in the preparation and implementation of comprehensive air pollution reduction programs.

Materials and methods

The population of this study was peoples in 22 districts of Tehran. Hence, this study was strati-

fied randomly (due to the heterogeneity of the society, stratified random sampling was used), and samples were chosen from each group as closely as possible in the studied community. The questionnaires were placed at the municipality centers of 22 districts and randomly completed by the people referred to the center. It should be noted that there was no time deadline for completing questionnaires.

The tool employed in this study was a researcher-made questionnaire consisting of three parts. Part 1; demographic information, which comprises the individual and background information of the samples, part 2; questions related to awareness about the influence of air pollution and its complications, as well as how to report air pollution and the third part is the questions related to the people's advice on the steps needed to reduce air pollution. The questionnaire questions were extracted using valid and accessible articles in this field. The validity of the questionnaire was evaluated and provided by the relevant faculty members, and its reliability was also calculated by calculating Cronbach's alpha, which was 0.72, indicating good reliability of the questionnaire. The questionnaire included questions about the importance of air pollution, the comparison of air quality with last year, the central causes of air pollution from the participants, the problems created by air pollution, the quality of air pollution reporting, as well as questions about their satisfaction about government's actions. After collecting questionnaires the data were analyzed by SPSS software then Ratio test and other descriptive indexes have been used. For the sample size, the G * power software [17] with a 90% power test and a 5% error rate were used. The sample size was calculated to be 202; because of deficient information in some questionnaires 10 % was added to the number of them, subsequently, we collected 238 questionnaires.

Results and discussion

The demographic data of the participants in the study is presented in Table 1. In terms of occupation, they included 2 school students, 13 students, 12 faculty members, 88 government employees, 65 private sector employees, 8 workers, 19 housewives, 2 tradesman, 17 independent jobs, and one unemployed. The classification of Tehran's areas in terms of welfare has been carried out to three levels: high, medium and low [18].

Table 1. The demographic data of the participants

Variable		Number
Sex	Man	99
	Female	138
Age	Less than 30	90
	31-50	129
	More than 50	18
Education	Diploma and less than that	48
	undergraduate degree	123
	Masters or PhD	66
Welfare	high	68
	medium	123
	low	47

In response to the question "how much air pollution is important to you?" air pollution was important for 36 participants (15.86 %), and 191 (84.14 %) considered a lot of importance to it. These two ratios are statistically different ($P_{value} < 0.001$), that is mean, more people considered a lot of importance for air pollution. In contrast to Tehran's air pollution last year, 136 (57.63 %) people consider Tehran's air very worse than the last year. Also, 43 (18.22) were evaluated worse, 34 (14.41 %) unchanged, 19 (8.05 %) better and 4 (1.69 %) very better. This shows that statistically, participants considerably weighed air quality worse than last year ($P_{value} < 0.001$). In the next section, a multi-choice question, "what do you think is the main agent of Tehran's air pollution?" was proposed. In this question, the main factors of Tehran's air pollution are as follows: 81 (34.32 %) construction, 151 (63.98 %) factories, 215 (91.10 %) cars, 117 (49.58 %) motorcycles, 33 (13.98 %) radiators and home packages, 95 (40.25 %) cigarette, 43 (18.22 %) dispose of waste, 60 % (25.42 %) other factors that not mentioned, this information is completely shown in Fig. 1.

The subsequent question was "how much air pollution has had a negative impact on your life?" 75 (31.78 %) of participates believed that air pollution had a small negative impact on their quality of life, but 161 (68.22 %) of participates believed that it had a significant negative influence on their quality of life. Statistically, numerous people believed that air pollution had a significant negative influence on their quality of life ($P_{value} < 0.001$). In the next section, a multi-choice question, "what were your problems with exposure to air pollution?" was raised. The results are shown in Fig. 2 that "shortness of breath" was the most choice. In response to the question "Satisfaction with the existing air pollution informing", 60.96 % dissatisfied and (39.04 %) expressed satisfaction. This indicates that people are not significantly satisfied with the air pollution informing. Additionally, in the next part, participants were asked to submit their suggestions on the air pollution information system. The information obtained is shown in Fig. 3 which the highest rate of informational offers was with TV news and SMS.

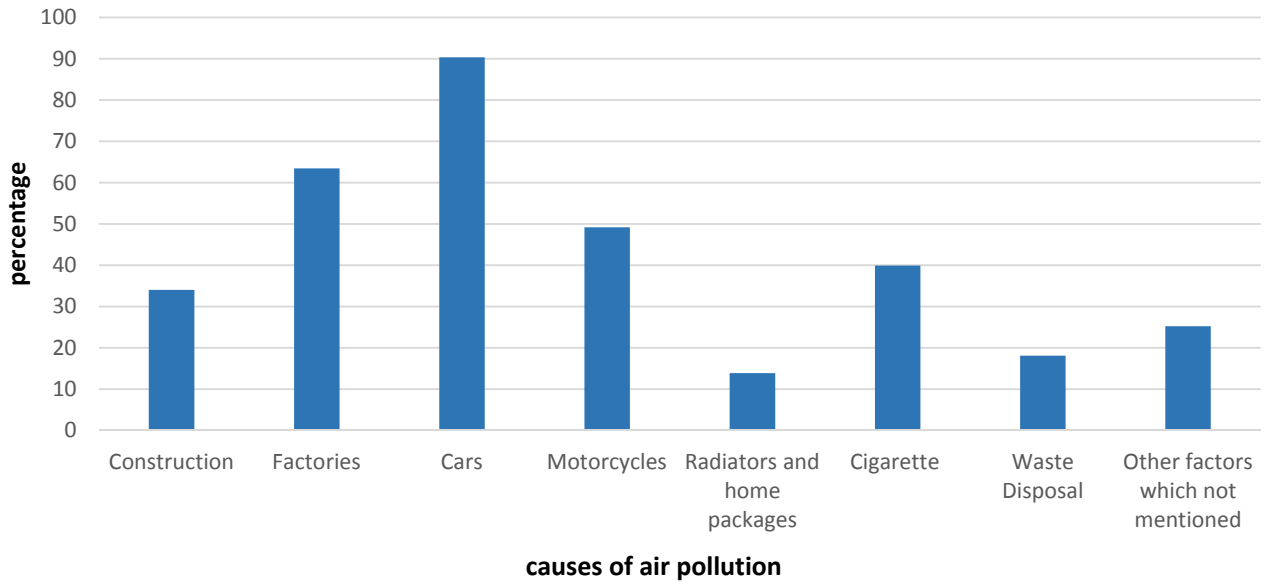

Fig. 1. Participants' remarks on the principal causes of air pollution

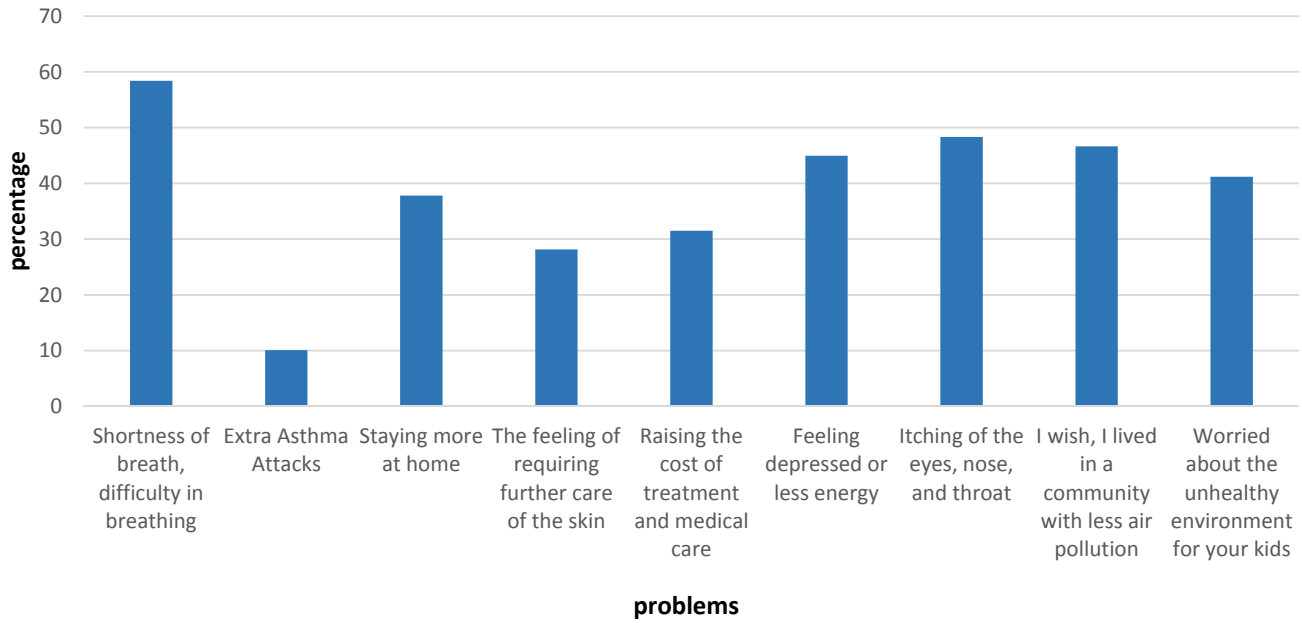

Fig. 2. Participants' remarks on the problems of exposure to air pollution

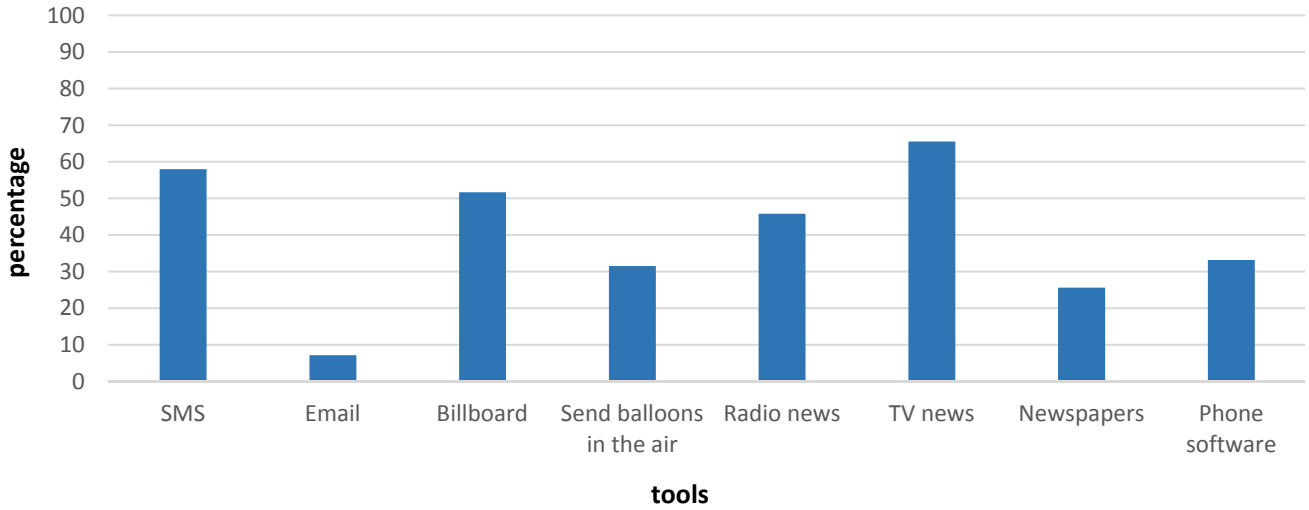

Fig. 3. Recommended tools for air pollution informing

The results of the question "frequency of air quality informing" indicate that 141(61.84 %) daily, 28 (12.28 %) weekly and 51(22.37 %) daily at least 3 times (morning, evening and night), they would like to know about air quality and air pollution in their city. 8 people (3.51 %) were not interested in becoming informed. About satisfaction with government measures to reduce air pollution, 42.54 % were satisfied and 57.46% opposed. Significantly, most people were not satisfied with government measures to decrease air pollution ($P_{value} = 0.024$). 62.82 % of respondents had done some measures to reduce air pollution and 37.18 % did not take any action. Hence significantly more participants had done some measures to reduce air pollution ($P_{value} < 0.001$). In the case of "awareness of the consequences of air pollution", 12.34 % do not care about the health effects of air pollution, and 87.66 % are important for them. Besides, about 28 % were optimistic about air

pollution control according to ongoing measures, and 72 % were not optimistic. Furthermore, 52.63 % were believed that school closures are effective in reducing pollution in air pollution conditions, and 47.37 % were not believed. So that there is no significant difference between these two options among individuals (P_{value} = 0.426). Regarding "the impact of districts and classification on the basis of well-being, and the awareness of the effects of air pollution on health," was significantly different in three levels of well-being (P_{value} = 0.029). So that the affluent strata of society, was less important than the middle and lower strata in order to know about the impacts of air pollution on health. In assessing the impact of participants' gender on their attitudes, the proportion of satisfaction with government measures to reduce air pollution is significantly different between men and women (P_{value} = 0.015). Women were more satisfied with the government measures to reduce air pollution, in others; there was no significant difference between men and women. About "the influence of the age group on time interval of air quality informing", whatever the age group was higher; they wanted to quickly be aware of the air quality (P_{value} = 0.023). Besides, significantly whatever the age group was lower, they more believed about the negative impact of air pollution on quality of life(P_{value} = 0.004). Additionally, in Fig. 4, participants' remarks are presented with age category about the central causes of air pollution. This represents a great awareness of fewer than 30 years among the other age groups.

Eventually, regarding the "impact of education on satisfaction with government measures to reduce air pollution," three categories of education varied significantly. As whatever the education level was higher, there was less satisfaction with government measures to reduce air pollution (P_{value} = 0.049).

The study showed that air pollution was important to most of the participants (84.14 %), and more than half (57.63 %) of they have considered that Tehran's air quality was worse than last year. These results indicate that people are concerned about this issue, and they are well aware of the hazards of air pollution. Since, according to several studies, the risk of air pollution in Tehran is very disturbing [19], this feeling of concern in people can be effective in developing a culture for action on air pollution. Although in previous studies, women were more concerned about envi-

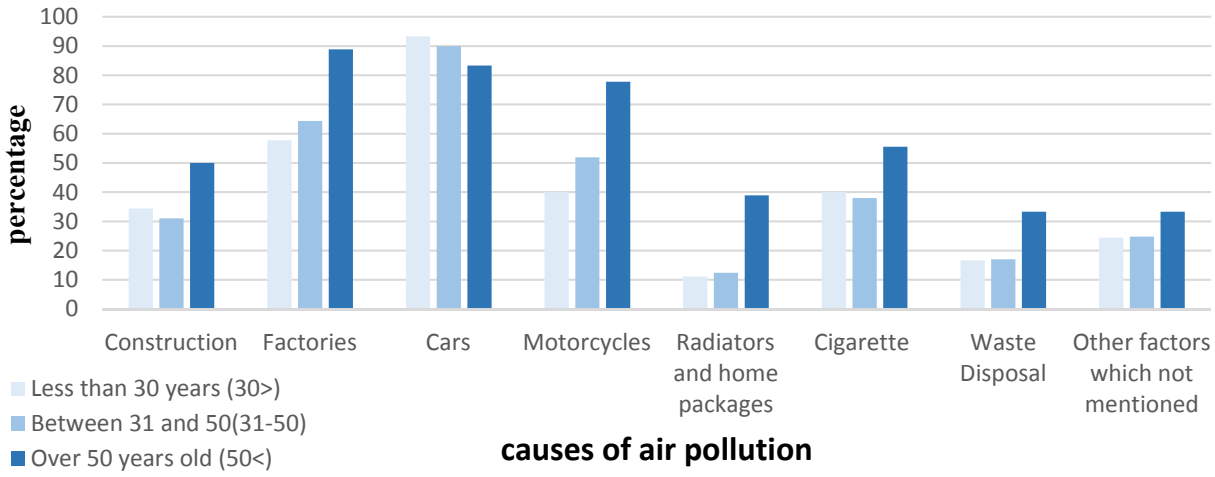

Fig. 4. Participants' attitudes toward the main causes of air pollution, by age group

ronmental issues than men [20], there was no significant difference between men and women in this study. In the next part, where people's views were studied about the principal causes of air pollution, According to Fig. 1, most people (91.10 %) considered cars as the central cause of air pollution. Besides, (63.98 %) factories and (49.58 %) motorcycles named as the main causes of air pollution. While, in Tehran, excessive traffic in light and heavy vehicles, motorcycles are a major contributor to air pollution whereas the factories have a lower contribution to air pollution [21]. This suggests that people are aware of the amount of pollution caused by cars. However more than half of them think that the role of motorcycles in pollution is insignificant; they wrongly accuse factories of more pollution than motorcycles. Likely this attitude is due to the lightness of motorcycles, which most people think that motorcycles create little pollution because of their small size. In response to the question "How much air pollution has your life affected?" (68.22 %) believed that air pollution had a significant negative influence on their quality of life. Significantly, Whatever the negative impact of air pollution on the person's life increases, the importance of air pollution for them further (P_{value} = 0.001). Also significantly, whatever the negative impact of air pollution on the person's life increases, they consider the air quality to be worse than in the previous year (P_{value} = 0.015). The role of air pollution in the development of cardio-pulmonary diseases is well-known [22-24], in this study, respondents according to Fig. 2, considered the shortness of breath and respiratory problems as the most difficult to deal with air pollution. Because of such problems, about 48.68 % of them would like to live in a place with less air pollution, and 42.98 % worry about the unhealthy environment for their children.

Today while most people have high-tech mobile phones, most people prefer to be aware of the status of air pollution via TV news and SMS. This could indicate that there is no suitable software for air pollution informing. Moreover, given that people are not satisfied with the existing informing system; this indicates that proper informing is not provided. So if the informing system improves, it can help to reduce air pollution.

Most participants believed that vital and necessary measures should be taken to reduce air pollution. They believed that the government should penalize air pollution generator companies and even shut down some of the companies, despite the fact that some people will unemployed. They emphasized that factories should change the pollutant maker processes, even if it would raise commodity prices. Also, they agreed to increase taxes to create a better environment. Plus they believed that the police should stop all old cars without a technical examination, and deal with them decisively. Participants thought that air pollution would be out of control and could not take action to reduce it. On the other hand, they emphasized that, if they knew the measures to reduce air pollution, they would take action to do it. And this suggests that people are not well aware of their role in reducing air pollution and more education is needed in this districts. This part has shown that people are well aware of the harmful effects of air pollution and they are willing to live at a higher cost but less polluted environment. In relation to the above, people also had expectations from the government: Prohibiting the production and entry of non-standard and high-pollution cars and motorcycles, prevent of urban expanding, expansion of the recycle programs, Dealing with office and commercial premises, automobiles and motorcycles producing pollutants, required trainings on the role of people in reducing air pollu-

tion, and availability of public transport systems with good quality and reasonable prices. Some people prefer personal car use to public transport because of problems like the bustle of the subway and BRT, Long waiting for a ride, as well as their high prices. This problem can be somewhat solved by increasing the number of subway trains and the number of BRT devices, as well as adjusting and controlling the prices.

In a study, It was shown that people's place of residence has an impact on their attitude toward the importance of informing about the quality of the air. In this way, people that lived in more polluted districts believed that they should be further aware of air pollution, while people that lived in less polluted districts would not believe that [25]. Our study results confirm this finding, for the affluent stratum, to being informed about the health consequences of air pollution was less important than the middle and low strata of society. This can have two reasons: less pollution in more affluent districts than other districts, and high awareness of affluent districts. Significantly, whatever the negative impact of air pollution on the person's life increases, air pollution becomes higher.

In another study, people aged 18 to 90 years found that people who were aware of air pollution threats had taken measures to reduce air pollution [11]. In this study, those who thought that air pollution had a negative influence on their lives had done more measures to air pollution. This suggests that people's awareness of the effects and perils of air pollution, as well as measures that can be taken to decrease it should be increased.

Satisfaction of the air pollution informing system, with the satisfaction of government measures to reduce air pollution, has a significant relationship. People who are dissatisfied with the informing system are also dissatisfied with the government's actions. Moreover, those who are not optimistic about controlling air pollution are not satisfied with the government's measures to reduce air pollution. Those who were not optimistic about ongoing efforts to reduce air pollution believed that close of schools does not affect air pollution. Contrariwise, those who were optimistic about it believed that close of schools decreases pollutants ($P_{value} = 0.029$).

Significantly, those who are more sensitive to air pollution likely tend to be informed faster about air quality ($P_{value} = 0.003$). Additionally, those who know further about the negative impacts of air pollution on their lives quality, considerably tend to be quicker aware of the air quality.

Conclusion

Generally, Tehran's people are extremely worried about the impacts of air pollution and strongly urge that the authorities should take serious measures to reduce this phenomenon. They are not satisfied with the actions taken in this field, the informing system of air quality, and are requesting for its development. According to the results of this study, people need to learn further about measures to decrease air pollution, the effects of it on their health and quality of life, somehow that if done; it can play an influential role in reducing of air pollution.

Financial supports

There was no funding for this study.

Competing interests

The authors confirm that there is no competing interest for this research.

Acknowledgements

The authors acknowledge the help and support provided by the Tehran municipality, Iran.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and / or falsification, double publication and / or submission, redundancy, etc.) have been completely observed by the authors.

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