Original Article

Community Perspectives on Air Pollution and its Related Health Risks: A Case Study of Tehran (2012-2013)

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Abstract

Background and purpose: Recent perspectives on public understandings of global environmental risk have emphasized the interpretation, judgment and sense-making "that takes place, modes of perception that are inextricably tied to aspects of and local" context. The main interest of this study is to observe the socio-demographic (gender, age, and education) differences in awareness of pollution and sources of air pollution.

Materials and Methods: The target population of this study were adult (>25 years) inhabitants of Tehran city. The information is gathered through a questionnaire conducted in various study areas then compared with demographic variables.

Results : Awareness of air pollution was highly found in higher educated of men, while this same result was observed within the women with lower education (under diploma). The results also showed that women in both groups are more concerned with all of the pollution than men.

Conclusion: With regard to health impacts, men perceived air pollution to be associated with respiratory disease, whereas women perceive asthma to be associated with air pollution.

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Key words: Air Pollution, Awareness, Community, Tehran

1. Introduction

Exposure to air pollution can cause both acute (short-term) and chronic (long-term) health effects. The acute effects of air pollution on human health were amply proven in the 20th century, when severe air pollution in Europe and in the United States caused deaths and disease in hundreds of thousands of people (1,2). Air pollution is a growing problem because of rising urban populations, unchecked urban and industrial expansion and the phenomenal surge in the number and use of motor vehicles (3). According to data collected by the Air Quality Control Company (AQCC) and the Department of Environment (DOE), Tehran is one of the worst cities in the world in terms of air pollution. Among the two types of emission sources, mobile sources are much worse than stationary sources (4). Over the years, there have been numerous concerns both in the public and professional domain about how air pollution affects health. This has resulted in a large number of health studies, but only a handful of these have used an approach where a community's knowledge and understanding has been taken into account (5). There has been very little research that explored public perception of the risks to health associated especially with air pollution. The frequently observed differences between the lay publics' perception of environmental and technological risks and that of scientific and policy experts has for long been a cause for concern and even unease among those that are responsible for the management of these risks, especially how social and cultural factors influence the way in which people understand and make sense of a certain risk (6). Studies that concentrate on the relationship between ill health and environmental pollutants will be flawed unless they consider respondents' perceptions and socio-behavioral factors. It is strongly argued that epidemiological studies of the association between air pollution and ill health need to address both actual exposure and the populations' perception about the risk (7). Knowledge of people's perceptions of environmental problems are important, as it reflects the social dimensions and circumstances in which people live. This knowledge helps to ensure that policy and communication frameworks achieve change in public attitudes, thereby acknowledging the importance of the understanding that people have of air pollution. People recognize that not all pollution can be experienced by the senses; therefore, perceptual cues are taken from the environment. Little research has been done on how perceptions of environmental issues are formed. If this information is used correctly, it has the potential to improve and develop appropriate policies and programs aimed at decreasing air pollution levels and associated negative impacts (8). Within this view, Tehranian people perception on air pollution was investigated.

2. Materials and Methods

2.1. Topography and air quality situation

Tehran is one of a few capitals of the world, which is not located around the river or even close to the sea. Mountains surround the city from North to the East and the city is divided into 21 districts. The total area of the city is about 700 km^2. There are four accurate seasons, with the annual mean rainfall at about 230 mm. The annual mean temperature is 17° C. The highest temperature is 39° C in summer and −6° C in winter. There is no rain for about 6 months of the year. Tehran is a political, industrial, and economical city. Air pollution in Tehran is increasing due to the rapid increase in population and development of industry. Twenty years ago, about 98.7% of the population of the city lived in Municipality of Tehran (MOT) area; but in recent years, it has decreased to 67% and about 33% of the population has moved to the suburbs. It was predicted that the population of the MOT and the suburb will increase to 9

and 17 million respectively by 2014. The strongest growth, proportionately, was experienced during the period from the end of World War II until 1966 with an annual growth of over 6%. The strongest growth was experienced during the period from the middle of 1960 to the end of the 1970, during this period the growth was over 200,000 persons per annum (9). These conditions make Tehran as one of the worst areas in the world for atmospheric pollution with many days exceeding air quality standards during each year (10). Due to the air pollution in the Great Tehran area, morbidity, mortality, and symptoms emerge. At the moment, the concentration of these pollutants is higher than the standard level most of the time, which means that they have numerous effects on the health of Tehran citizens (10) According to data collected by the AQCC and the DOE, Tehran is one of the worst cities in the world in terms of air pollution. Among the two types of emission sources, mobile sources are much worse than stationary sources. Japan International Cooperation Agency (JICA) predicted that about 71% of air pollution in Tehran is produced from mobile emission sources. The increase of urbanization in Tehran will increase energy consumption, which will increase air pollution relating to stationary emission in future (11).

2.2. Questionnaire design

In this study, a questionnaire was used as a based approach to gather qualitative data. The questionnaire included fixed response as well free response questions. A qualitative approach was used as it attempts to understand people in terms of their own definitions of their world. It helps to provide illumination on complex psychosocial issues and is useful in answering questions such as how and why. Participants were drawn over a 1-year period (2012-2013) from various communities in different districts (1, 2, 3, and 5) of Tehran. The questionnaire was developed in a way that consisted of multiple choice questions on age, gender, pollution awareness, sources of air pollution, and its health impacts identified by residents.

2.3. Data collection

The strategy for data collection included a number of approaches. The questionnaire formed the starting point for data collection. In some cases, this was followed by individual or household interviews in order to provide a better reflection on the diversity of spatial, demographic, socio-economic, and political characteristics. Interview based, or observation based reports enable a more in depth elicitation and contextualization of meanings attached to risk. Individual/household interviews allow for a more in depth exploration of perceptions and attitudes. This data helps to explore public views on air quality and health within the local, social, cultural, and economic contexts in which these views are framed and negotiated. Comparison of responses to questions with particular variables then reveals the extent of associations. Variables such as age, income, education, and race, views of local pollution sources, sources of information on air quality, sense of place, proximity, and stigma have been analyzed against the perceptions of those staying in each of the demarcated study areas. The questionnaire was completed by 110 people in Tehran either through telephone interviews, filling in at home or during individual interviews. The process to obtain data was divided into two parts. The first part comprised data collection by means of administering the questionnaire. This was done through telephonic interviews, giving it to people to fill out and with the assistance of intermediaries. In the second part, the responses to the questions that were obtained during the first part were used to identify respondents. The study took place over 12 months during, which the questionnaires were administered, and interviews were conducted. As an introduction to each interview session,

the researcher broadly described the aim of the project without referring to the research questions. Depending on the interviewee, it was sometimes necessary to prompt them to elaborate on an answer or to keep the discussion focused. The focus group consisted of residents that lived within the area for more than 20 years.

2.4. Data analysis

The final data analysis was done quantitatively and qualitatively. By using a qualitative approach it would provide an in-depth, although not generalized knowledge of the meanings participants attach to their local situation. Results were collected and analyzed by gender, education and cultural group. The results were then analyzed for each area. The completed questionnaires were examined, and information for each individual and their responses were entered into the computer using the Atlas software system (www.atlasti.com) in order to store comments and responses for each question item for easier reference. This system was able to provide a basic quantitative analysis, but did not yield much information from the point of view for research analysis. The questionnaires were divided into the relevant study areas and then into gender groups.

Each answer for an item was allocated a score of "1" if raised, eventually totaled and then divided by the number of participants in the sample group to express it as a percentage. After each interview, the main ideas were summarized by the researcher and an impression was written of the general trends and differences and how viewpoints depend on individual backgrounds and experiences.

3. Results

A total of 90 respondents were interviewed by telephone or filled in a questionnaire: 35 men and 55 women, differing in age, ethnicity, and socio-economic status. The results were divided into those with higher education other than diploma (54.3%) and those who had diploma or lower (45.7%). In terms of the total sample interviewed, women and men make up 61.1% and 38.8 % of the sample interviewed, respectively. The results of the questionnaires were divided according to those respondents that had a general education (in other words, diploma, or lower) and those who had a higher education (education after obtaining diploma). Throughout the research a general education will be abbreviated with DED and a higher education with HED. This division is related to research done by other researchers, which showed that people make their own assessments of health, by judging conclusions against their personal experience and knowledge. For example, people with a higher education are inclined to underestimate the number of deaths associated with environmental risks. Research in social science has come to the point of acknowledging the different ways people understand and frame risk based on their cognitive level of understanding [Bickerstaff (6), Brody et al.(13)]. Results were also subdivided by gender. The results obtained for each gender are shown in figure 1.

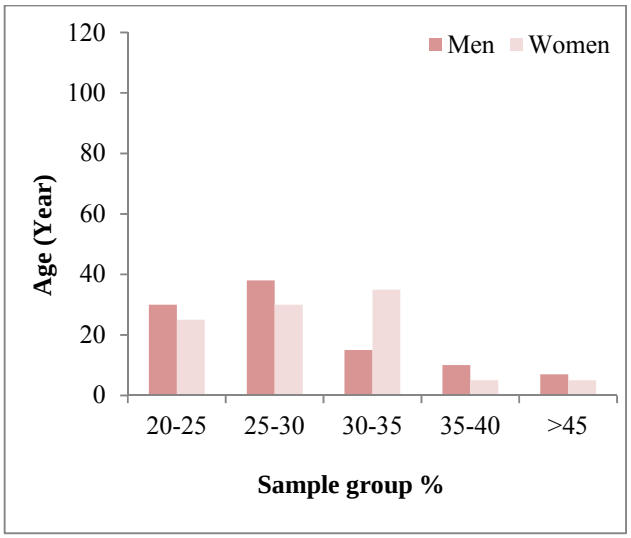

Figure 1. Demographic breakdown for each gender

The results of pollution awareness for each gender/education are shown in figures 2 and 3.

The results of air pollution sources identified by men and women are exhibited in figure 4. It is clear the sources with the most responsible contributor of Tehran are "mobile sources" which include various vehicles. According to data collected by the AQCC and the DOE mobile sources are much worse than stationary sources (4). The air pollution health impacts perceived by each gender is shown in figure 5.

Generally speaking, men feel that their health is affected strongly by respiratory disease, which 40% believe that respiratory diseases are associated with air pollution, whereas this is the case for only 5% of women. Yet 20% of the latter group believes asthma to be associated with air pollution, compared to 35% of men.

In order to analyze statistically the association in each gender in terms of sources of air pollution the Kolmogorov-Smirnov test was used to compare the maximum absolute difference between the two distributions (men and women). The outputs are shown in table 1.

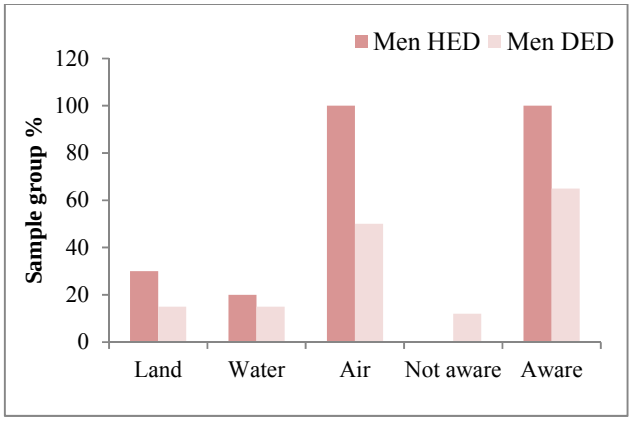

Figure 2. Pollution awareness among men

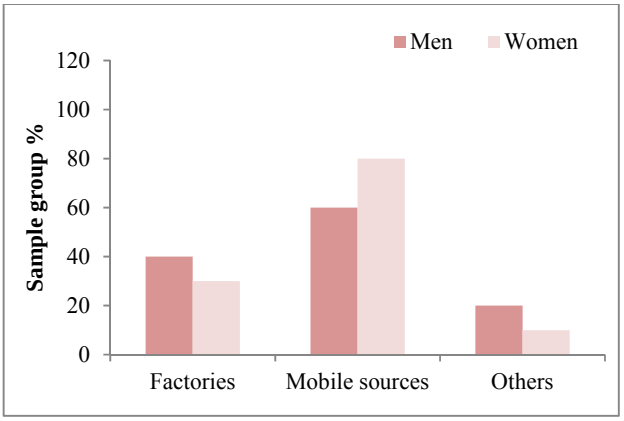

Figure 4. Sources of air pollution identified by each gender

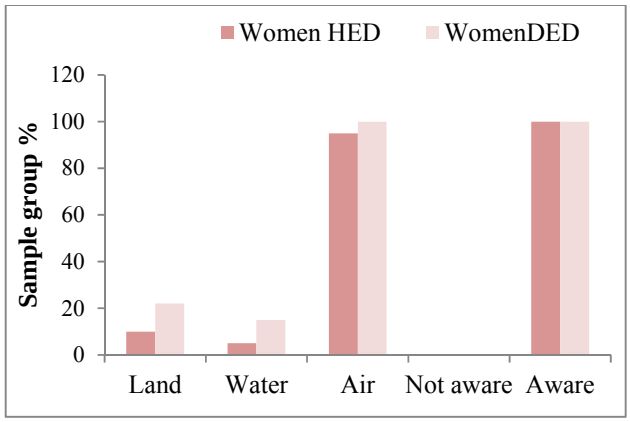

Figure 3. Pollution awareness among women

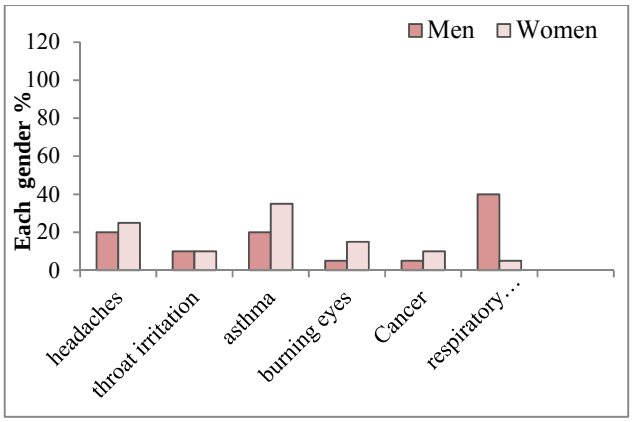

Figure 5. Health impacts perceived by each gender

Table 1. Statistics on sources of air pollution identified by demographic subgroup

Gender	Statistics											
	Factories				Mobile sources				Others			
	N	AM	SD	P-value	N	AM	SD	P-value	N	AM	SD	P-value
Men	100	40	11.3	0.045	100	60	11.4	0.036	100	20	11.1	0.27
Women	100	30	10.6		100	80	10.2		100	10	9	

AM: Arithmetic mean; SD: Standard deviation

4. Discussion

While only 12% from DED group of men sampled claim not to be aware of any pollution (Figure 2), a further 30% claim that water and land pollution is also a problem. Noteworthy, as seen from figure 3, is that 100% of men with a higher education are aware of air pollution. Similar high levels of awareness are found with other men, as can be deduced from figure 3. These levels of awareness are unusual in that research by other researchers who showed that men who are politically and/or economically advantaged, tend not to associate air pollution as a problem in the areas where they live. Totally, by comparing the awareness in two genders it is found that women are more aware than men in case of air pollution.

Regarding pollution awareness for women (Figure 3), it was noticed that 95% of women with a higher education and 100% of women below diploma are aware of any form of air pollution, while 10% seem to be concerned with land pollution. This is probably the result of the respondents working long hours (shift work) and not being at home for extended periods to notice air pollution (6).

Other researchers also found significant differences between male and female students' perceptions, namely that women have a greater environmental sensitivity about smoke and fumes as pollutants (12). However, Howel et al.(5) found little difference in the views of air pollution between male and female. It was suggested however that women do tend to express a higher concern for environmental issues that affect local aspects such as living in an area that is in close proximity to industry and strongly associated health impacts.

JICA predicted that about 71% of air pollution in Tehran is produced from mobile emission sources. The increase of urbanization in Tehran will increase energy consumption, which will increase air pollution relating to stationary emission in future (5,13). The difference in health related impacts perceived by each gender could be attributed to men who are socially more advantaged in terms of life experience being able to distinguish better between asthma and wheezing. With regard to health impacts, an important observation in figure 5 is that men perceive air pollution to be associated with respiratory disease, whereas women perceive asthma to be associated with air pollution. With regard to headaches, women showed the highest percentage, namely 25%, compared to 20% for men. In a research conducted by Alidadi et al.(14) on air pollution mortality in Mashhad, no significant relation between CO and mortality rate was observed though other pollutants played a significant role in this regard. The maximum correlation was obtained for SO_2 and O_3 in the concentrations of 0.936 and 0.154 ppm, respectivelyBased on the results obtained from table significant differences in factories and mobile sources as sources of air pollution were observed between two genders ($P < 0.05$) while no significant gender differences is seen in perception of other sources.

In this paper, people awareness of air pollution was investigated. A questionnaire was designed, and the outcomes were evaluated in terms of gender, age, awareness of pollution and sources of air pollution identified by each group. The results showed that men with higher education were more aware that air pollution while among women, this was higher in under diploma. Mobile sources, especially vehicles were the first contributor of air pollution identified by both gender. Kolmogorov-Smirnov test showed significant differences between each gender in terms of factories and mobile sources of air pollution.

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References

1. Ciocco A, Thompson DJ. A follow-up of Donora ten years after: methodology and findings. Am J Public Health Nations Health 1961; 51: 155-64.
2. Nemery B, Hoet PH, Nemmar A. The Meuse Valley fog of 1930: an air pollution disaster. Lancet 2001; 357(9257): 704-8.
3. Elsom D. Smog alert: managing urban air quality. London, UK: Earthscan; 1996.
4. Department of Environment. Laws and regulations relating to protection of Environment. Tehran, Iran: Department of Environment; 2000.
5. Howel D, Moffatt S, Bush J, Dunn CE, Prince H. Public views on the links between air pollution and health in Northeast England. Environ Res 2003; 91(3): 163-71.
6. Bickerstaff K. Risk perception research: socio-cultural perspectives on the public experience of air pollution. Environ Int 2004; 30(6): 827-40.
7. Hunter PR, Davies MA, Hill H, Whittaker M, Sufi F. The prevalence of self-reported symptoms of respiratory disease and community belief about the severity of pollution from various sources. Int J Environ Health Res 2003; 13(3): 227-38.
8. Bickerstaff K, Walker G. Public understandings of air pollution: the 'localisation' of environmental risk. Global Environmental Change 2001; 11(2): 133-45.
9. Asadollah-Fardi G. Current situation of air pollution in Tehran with emphasis on District 12. Proceedings of 1st Kitakyushu initiative meeting; 2011; Kitakyushu, Japan.
10. Hosseinpoor AR, Forouzanfar MH, Yunesian M, Asghari F, Naieni KH, Farhood D. Air pollution and hospitalization due to angina pectoris in Tehran, Iran: a time-series study. Environ Res 2005; 99(1): 126-31.
11. Japan International Cooperation Agency. The study on an integrated master plan for air pollution control in the greater Tehran area in the Islamic Republic of Iran. JICA; 1997.
12. Myers G, Boyes G, Stanisstreet M. School students' ideas about air pollution: knowledge and attitudes. Research in Science and Technological Education 2004; 22(2): 133-52.
13. Brody SD, Peck BM, Highfield WE. Examining localized patterns of air quality perception in Texas: a spatial and statistical analysis. Risk Anal 2004; 24(6): 1561-74.
14. Alidadi H, Shakeri M, Hoseinzadeh A, Noorani A. Relation between mortality rate and air pollutant concentrations in Mashhad, 2007-200. IJHS 2013; 1(2): 68-74.