

## Dust Phenomenon: Threat Appraisal of Cardiovascular Patients

Mehdi Mojadam<sup>1</sup>, Mohammad Hassan Ehrampoush<sup>2</sup>, Nematollah Jaafarzadeh Haghighifard<sup>3</sup>,  
MortezaAbdullatif Khafaie<sup>4</sup>, Hossein Fallahzadeh<sup>5</sup>, Mohammad Ali Morowatisharifabad<sup>6,7</sup> \* 

<sup>1</sup> Department of Public Health, School of Public Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

<sup>2</sup> Environmental Science and Technology Research Center, Department of Environmental Health Engineering, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>3</sup> Environmental Technology Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

<sup>4</sup> Social Determinants of Health Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

<sup>5</sup> Research Center of Prevention and Epidemiology of Non-Communicable Disease, Department of Biostatistics and Epidemiology, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>6</sup> Department of Ageing Health, School of Public Health, Shahid Sadoughi University of Medical sciences, Yazd, Iran

<sup>7</sup> Elderly Health Research Center, School of Public Health, Shahid Sadoughi University of Medical sciences, Yazd, Iran

### ARTICLE INFO

#### QUALITATIVE ARTICLE

##### Article history:

Received: 22 Feb. 2020

Revised: 20 May. 2020

Accepted: 28 May. 2020

##### \*Corresponding author:

Mohammad Ali Morowatisharifabad

##### Address:

Elderly health research center,  
School of public health, Shahid  
Sadoughi University of Medical  
sciences, Yazd, Iran

##### Email:

[m.morowati@ssu.ac.ir](mailto:m.morowati@ssu.ac.ir)

##### Tel:

+98-35-31492257

### ABSTRACT

**Introduction:** Dust phenomenon is a major environmental problem in world that threatens the middle-east countries specifically. In order to develop a need-based policy and regulate the supporting health program to reduce dust effects requires a proper understanding of the public beliefs about threats posed by this issue. The purpose of this study was to explain the threat appraisal patients with cardiovascular diseases regarding exposure to dust phenomena.

**Method:** This qualitative content-analysis study was conducted from January to June 2018. The participants included 28 cardiovascular patients who referred to the healthcare centers in Ahvaz City. Semi-structured interviews were conducted with open-ended questions and inspiration from threat appraisal process constructs were used to collect data. All data were gathered, transcribed, and analyzed using MAXQDA-10 software and in-depth analysis.

**Result:** Perceived threat constructs were used and 4 categories and 9 sub-categories were extracted: perceived likelihood of exposure to dust (perceived likelihood of increased non-respiratory problems, perceived likelihood of increased respiratory problems), belief in seriousness and danger of exposure to dust (understanding the severity of physical complications, understanding the severity of mental and psychological complications, understanding the severity of economic complications), external reward of exposure to dust (improving personal and social relationships, improving financial problems), internal reward of exposure to dust (pleasant feeling).

**Conclusion:** This study provided a clearer and deeper understanding of the threat posed by exposure to dust among cardiovascular patients. Based on the results, the authorities can design more targeted and more effective protective plans to raise awareness among community members, especially cardiovascular patients about the negative effects of exposure to dust and the ways to reduce its exposure.

**Keywords:** Dust, Perceived Threat, Cardiovascular Patients, Ahvaz

## Introduction

One of the most important consequences of climate change in recent years is increase of dust storms that affect various sectors of the community directly and indirectly (1). Dust phenomenon is one of the most frequent atmospheric and climate disasters in Iran due to its presence in an arid and semi-arid belt of the world. Dust phenomenon affects the local and regional dust scale systems (2). Dust is a mass of solid particles of dust and smoke distributed in the atmosphere that restricts horizontal visibility (3). According to the definition of the World Meteorological Organization, a dust storm is the wind that is special for arid and semi-arid areas, as a result of which a dense cloud of dust builds up in the air and prevents seeing (4).

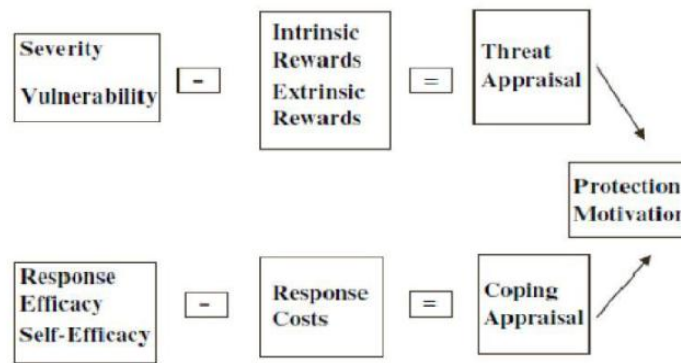
One of the most important environmental problems that threatens many developing countries is air pollution and dust particles are one of the most important air pollutants (5, 6). Research suggests that the source of dust storms is arid and semi-arid regions, especially Sahara, Middle East, Southeast Asia, and Mongolia. Northwest American and Australian regions are also known as other sources of dust(7). The Sahara desert in Africa is the largest dust source in the world, bringing about 700 million tons of dust per year to the atmosphere, so that about 70 percent of the dust storms originate from African deserts(8).

Iran has been faced with dust storms over the past years due to its adjoining to a large part of the desert areas. One of the regions of Iran affected by this phenomenon is Khuzestan province in the southwest of the country(9). In this regard, at the time of dust phenomenon, the visits to the Ahvaz medical centers rose by 70%.

The damage caused by inappropriate sanitation. Furthermore, closure of schools, airports, and offices imposed more than four Thousand billion Tomans cost per year (10).

Air pollution is one of the most important health concerns due to its adverse effects on human health (11). Considering that dust particles have very small dimensions of 10 microns, they can enter the end of respiratory tract and then enter the bloodstream and damage the body organs and cause cardiovascular and respiratory diseases. Increase of the suspended particles can have a significant relationship with increased risk of cardiovascular diseases, so that cardiovascular diseases caused by air pollution are responsible for 30% of deaths worldwide. These effects also lead to increased costs and lower quality of life among exposed individuals(12) and lead to symptoms such as inflammation of eyes and respiratory tract, especially in vulnerable people such as babies, children, elderlies, pregnant women, cardiovascular patients, and patients with respiratory tract problems (13, 14).

Studies provided valuable tools for understanding and solving a wide range of behavioral problems. Numerous theories of hygiene behavior exist that try to explain why people behave or fail to behave. Health behavior theories are very important for understanding behaviors and interventions to increase health behaviors(15). Some studies suggested that interventions should have a motivational component(16), including the protection motivation theory introduced by Rogers in 1975. This theory has been widely accepted as a framework for prediction and intervention in health-related behaviors(Figure 1)(17).



**Figure 1.** Protection Motivation Theory

Based on this theory, threat assessment evaluates maladaptive behaviors and includes rewards for inaccurate behaviors and perceived threats (severity and vulnerability). Reception of rewards after improper behaviors increases the likelihood of choosing maladaptive responses, while perceived threats reduce maladaptive choices (18, 19). This means that based on the protection motivation theory, cardiovascular patients are likely to perform dust avoidance behaviors if they believe that they are susceptible to dust (perceived susceptibility) and dust exposure is serious and dangerous (perceived severity). Furthermore, they are likely to perform dust avoidance behaviors in the case that the rewards of receiving inappropriate behavior are less.

Considering the necessity of recognizing the experiences of cardiovascular patients in understanding the threats posed by dangers of exposure to dust qualitatively and limited number of similar studies this study was conducted. To this end, the theory of protection of motivation was used to explain the experiences of cardiovascular patients from threat appraisal in the context of exposure risk to the dust phenomenon.

## Materials and Methods

### Study design

This content-analysis study was conducted qualitatively, since qualitative studies are appropriate for analyzing qualitative studies, in which the collected data are summarized, described, and interpreted(20). This type of study is used to determine the dominant and main

themes(21) and is a suitable method for reviewing the experiences and attitudes of individuals(22).

### Participants and sampling

This study was conducted during the first 7 months of 2018 on 28 cardiovascular patients covered by Ahvaz health centers, southwest of Iran. These groups of participants are vulnerable due to their illness and are expected to be more involved in the interviews to provide their experiences. Participants were selected from patients with cardiovascular disease who referred to health centers using targeted sampling method. The sampling was conducted considering high diversity in participants' age, gender, ethnicity, education, place of residence, and exposure to hazards in a targeted way. Individuals with confirmed diagnosis of cardiovascular disease by a physician, had lived in Ahvaz at least one year before the study, and had ability to express their experiences could enter the study.

### Data collection

Data collection was based on semi-structured individual interviews using the interview guide lines based on the threat appraisal process constructs. The interview questions were: (1) What factors make cardiovascular patients vulnerable to dust phenomenon? (2) How vulnerable do you consider yourself to dust phenomenon? Please explain more. (3) Have you seen an increase in exposure to dust phenomenon? Please explain more. (4) What happened to you in dust exposure? Explain a little. (5) What encourages you to be exposed to dust? (6) Although you know that

dust exposure is harmful for you, why do you go out at the time of dust?

During the interviews, the main focus was on the participants' description of their experiences. Moreover, exploring questions were asked to clarify and resolve ambiguities and to deepen the responses; such as "Could you give an example? How? And explain more?" Interviews lasted from 11 to 41 minutes. The interviews were recorded, transcribed, and encoded to provide the necessary feedback on the adequacy and data saturation. Interviews continued until data saturation and duplication of data. A total of 28 interviews were conducted by a trained researcher. Two of the invited people were not interviewed.

#### **Ethics approval and consent to participate**

Ethical standards were met by receiving the participants' informed consent, giving them the right to withdraw from investigation, and ensuring them about confidentiality of personal information. In this regard, the Code of Ethics No. IR.SSU.SPH.REC.1396.36 was obtained from the School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

After selecting the participants and providing them with the study purpose, the interviews were conducted in places where the participants felt more comfortable and could express their experiences better. At the beginning of the interview, the researcher explained about the goals, methods, and stages of the interviews for the participants. After obtaining their consent to enter the study, permission to take brief notes of non-verbal observations and behaviors during the interview, and permission to record the interviews, the interview was conducted and the data were analyzed(23).

#### **Data analysis**

Data analysis was conducted on the basis of directed qualitative content analysis and according to Lundman & Graneheim's stages. Initially, the entire interview was transcribed completely immediately after each interview. The entire text content was reviewed several times. The units of meaning and primary codes were determined.

Similar primary codes were classified under more comprehensive categories and the main theme of each category was determined(24). In order to extract the themes, text of each interview was broken down line by line and the units of meaning were extracted, which were considered as the first-level codes. Later, based on the similarity and differences, initial codes were sorted and categorized into larger categories, where the main theme of each construct was identified.

#### **Scientific trustworthiness of the results**

In order to ensure the accuracy and robustness of the data, Guba and Lincoln's criteria were used such as acceptability, reliability, reliability, and transmission capability(25). The researchers' long-term involvement with participants and their active participation in data collection and analysis provided accurate information. Furthermore, the full text of a number of coded interviews was provided to the participants to evaluate accuracy of the contents (26). Therefore, some participants were asked to compare the codes assigned to the interview content with the original text and to evaluate appropriateness of the scholar's proper perceptions. To confirm reliability of the data, the collected data were analyzed and interpreted immediately after the interviews. In addition to the notes taken during the discussion or interview, the participants' non-verbal behaviors were also considered; the interviews' transcribed texts and notes were reviewed and re-coded several times. The results of initial coding were compared with the codes of each interview and changes were made, if necessary, to achieve common codes. Finally, in order to increase the transmission capability, all research processes were prepared in a clear and accurate manner. Later, the related files were stored and maintained to allow other researchers to follow the research pathway.

#### **Results**

In the present study, 28 people participated including 16 males and 12 females. The participants' age ranged from 47 to 61 years (Table 1). The primary codes of data analysis were 167 cases, which reduced to 38 initial codes after

merging the data. After analyses, all initial codes were categorized under 9 subcategories and 4 categories (Table 2).

**Table 1.** Demographic variables of participants in the study

Variable	Classes	Number	Percentage
Age	32-46 years	6	21.42
	47-61 years	13	46.42
	62-77 years	9	32.14
Gender	Male	16	57.14
	Female	12	42.85
Ethnicity	Arabs	10	35.71
	Bakhtiari	11	39.28
	Lor	2	7.14
	Fars	5	17.85
Education level	Illiterate	3	10.71
	Elementary	8	28.57
	Guidance	8	28.57
	High school	4	14.28
	Academic	5	17.85
Occupation	Worker	4	14.28
	Employee	4	14.28
	Farmer	1	3.57
	Housewife	9	32.14
	Retired	8	28.57
	Free job	2	7.14

**Table 2.** Threat appraisal of cardiovascular patients in the risk of exposure to dust

Theme	Category	Sub Category
Perceived sensitivity	Understanding the likelihood of exposure to dust	Understanding the likelihood of increased non-respiratory problems following exposure to dust
		Understanding the likelihood of increased respiratory problems following exposure to dust
Perceived severity	Believe in the serious and dangerous effects of exposure to dust	Understanding the severity of the physical complications of exposure to dust
		Understanding the severity of mental and psychological complications of exposure to dust
		Understand the severity of the economic complications of exposure to dust
Perceived rewards	External rewards for dust exposure	Improve individual and social relationships Improve financial problems
	The internal reward for dust exposure	A pleasant inner feeling Increased sense of self-esteem

**Perceived sensitivity theme:** Most participants had perceptible sensitivity and felt threatened due to their living conditions that imposed exposure to dust. In this category of cardiovascular patients, an increased likelihood of post-exposure dysfunction was observed, such as possibility of boredom and low-burden, incidence and severity of heart

disease, and digestive problems. Participants expressed their experiences in dealing with dust with the following phrases: "When it is dusty, I am so bore; it gives me an unbearable feeling of boredom"(P 17).

"When I go out in the dusty weather, I feel my heart is burning after I return home" (P 2).

*"My chest hurts and my heart burns"* (P 5).

Some participants talked about gastrointestinal problems: *"My stomach pains and I have diarrhea for two or three days"* (P 2).

According to information provided by some cardiovascular patients, the likelihood of respiratory problems increased after exposure to dust. The participants mentioned the possibility of respiratory air pollution, respiratory problems, and choking.

*"I cannot go to the courtyard at all if it is dusty, since the soil is infected and I cannot breathe"* (P 14).

*"...If I go outside, or get dust in the house, I cannot breathe appropriately"* (P 5).

**Perceived severity theme:** This theme included risk perception or serious damage caused by dust exposure. This theme consisted of believing in the seriousness and dangers of dust exposure, which involved reducing physical activity and causing joy or disappointment up to death. Among the many possible complications that can occur in the event of exposure to dust in cardiovascular patients, physical symptoms were more pronounced. Accordingly, some cardiovascular patients believed that exposure to dust reduced their physical activity, caused poisoning by inhaling polluted soils, and increased the number of visits to hospitals, caused cancer and death.

*"Dust causes complications in terms of physical activity"* (P 24).

*"On the dusty days, the hospitals, clinics, and health centers are very crowded. There are many visitors"* (P 1).

*"...On a dusty day, the hospital emergency room did not have any empty bed"* (P 25).

Another Participant mentioned the poisoning caused by inhalation of the contaminated soil, which was due to the rise of soil from the war zones of Iran, Iraq, or Kuwait: *"The soil is often poisonous, it was eight years of war, and then there were wars in Iraq. The soil comes from these places"* (P 16).

*"Dust can make a lot of cancers"* (P 25).

Finally, most patients acknowledged that exposure to dust could cause death in

cardiovascular patients. *"In many cities, different regions, in our society, and in recent years we have seen that dusty days increased the death rates in people with a history of cardiovascular and respiratory diseases"* (P 25).

Another person expressed severity of the situation by saying: *"If you do not have a heart problem, it will cause death"* (P 12).

Another subcategory was perception of the mental and psychological complications' severity. Patients in their interviews referred to severe impairment in family relationships along with stress, psychological complications, and frustration. *"I saw a man that his eyelashes, hair, and beard were dusty, I became upset for him. I told him: dear my son, I have a mask in my purse, I can give it to you', but they refused"* (P 15).

*"...I have heart disease, when I see the air is regularly infected, I feel that I am getting closer to death"* (P 24).

*"When I am staying at home, I am going to fight with my wife; God is witnessing, if she does not go outside, we will talk about something and we will fight "* (P 8).

Another subcategory understood the severity of economic burdens. Few participants said that dust would increase health expenditure on the household. Some participants said that dust had increased the working off days and schools, which disrupts livelihoods.

*"We have lots of days off, which means lower income to us"* (P22).

*"The people who have responsibilities in offices are forced to stay home; so, not much office work can be done...There are also some routine things that get disturbed "* (P24).

*"... Dust has increased my spending on drugs and treatment"* (P9).

**Perceived reward theme:** An individual's assessment of the internal and external rewards related to unhealthy behavior is called a 'perceived reward'. Internal and external perceived rewardscan increase the likelihood of maladaptive behaviors. This theme implied understanding or beneficial participatory mental experiences in dealing with the dust phenomenon. *"And with the*

*moral commitment that I have to my job, I have to go" (P24).*

The external perceived reward returns to the social confirmation. The results of interviews showed that such rewards included avoiding tension and conflict with the family, being entertained, communicating with relatives, and receiving more financial benefits. *"At least go out and have some fun, even if it is dusty" (P6).*

*"One of the relatives died, we had to attend the ceremony in the dust; if we did not, they would get upset. They did not say it is dusty, and people may get sick" (P18).*

*"People need to make money to live" (P3).*

### Discussion

This study aimed at explaining the experiences of cardiovascular patients from threat appraisal to the risk of exposure to dust phenomena. Based on the findings, perceived threat constructs (including perceived sensitivity classes, perceived severity, and perceived rewards) enabled researchers to examine effective factors on the risk behaviors for exposure to dust.

According to finding, cardiovascular patients acknowledged about the risk of complications at risk of exposure to dust. Accordingly, cardiovascular patients noted an understanding about the possibility of increased non-respiratory problems following exposure to dust as the likelihood of boredom and intolerance, increased mortality, developing or exacerbating heart disease, and gastrointestinal problems following dust. They also identified the possibility of increased respiratory problems caused by reduced oxygen delivery to the body, the possibility of breathing polluted air, and the possibility of suffocation. In this regard, in the study of Ramezankhani et al. showed that more than half of the teachers considered themselves susceptible to the dust phenomenon (27). The results of these studies were not consistent with our study. However, AmornratPraphant stated that half of the participants had a high perceived sensitivity to dust-related illness(28), which was consistent with the present study. In the study by Winham et al,

over women's heart health behaviors, lower perceived sensitivity was less than 50%. As a result of the perceived risk of women(29), Dewitty et al. suggested that perceived susceptibility to heart disease was low; this findings are consistent with the present study(30). Perhaps one of the reasons for these differences is the difference in the studied groups. Another reason for lower perceived susceptibility seems to be the cardiovascular patients' low levels of knowledge about the ways to reduce the risk of dust exposure. On the one hand, studies show that self-care behaviors increased with increased perceived sensitivity(31, 32). Therefore, the need for training and sensitization about the risks of dust exposure without protection is necessary.

In relation to perceived severity, participants believed that these particles were hazardous, which is a very positive factor in protecting behaviors. Some participants noted severe physical complications, such as cancer and the possibility of poisoning, while others focused on increasing hospital admissions and the need for medical care. Some participants also mentioned symptoms such as itchy eyes and coughing. Regarding the mental and psychological complications, the feelings of death, despair, and hopelessness created psychological pressure in people, which could result in family conflicts. Taheri et al. also stated that dusts not only harmful for the health of farmers, but also affects them psychologically(33). Amornrat Praphant found that the perceived severity and severity of exposure to dust was moderate in terms of its disability and mortality (28). These results were not consistent with the present study. Ramezankhani et al. reported that more than half of the teachers believed that dust particles were hazardous(27), which is consistent with the present study. High levels of perceived hemorrhage are likely to be due to increased heart disease, increased hospitalization and visits to treatment centers, digestive problems, or increased closure of departments and schools caused by dust particles. Experts believe that the combination of sensitivity and severity of perceived

comprehension provides motivation and strength to conduct a behavior(34).

The results also showed that the rewards for improper behaviors were not appropriate, so that more than half of the cardiovascular patients go out in the dust to be away from tension and conflict with the family, be entertained, improve relationships with relatives, and receive more salary, financial benefits, and self-reliance. The results of this study were similar to those reported by Babazadeh et al., farmers in assessing the risk of skin cancer. In their study, more than half of the farmers reported improper behaviors and non-implementation of skin cancer prevention behaviors(35). Ghasemi and Green studied students and mentioned that the participants could not smoke because of the rewards received from this unhealthy behavior(36). It should be noted that training is hard in this regard because changing habits and attitudes of several generations are time-consuming and require serious, all-out, and inter-sectional efforts. Unfortunately, no specific training programs have been designed to reduce the risk of exposure to dust and few academic or general courses are available in this area.

The present study, due to its qualitative nature, was more concerned with depth of the problems. The aim was to identify the perceived threats; so, its findings cannot be generalized to other communities, which is a limitation of this study. This study only took into account experiences of the cardiovascular patients that are another limitation to the study. So, future researchers can investigate the experiences of other target groups in this regard.

### Conclusion

Results of this research help planners to develop the most appropriate methods and strategies in order to design and implement interventions to raise awareness among the community members, especially cardiovascular patients. These patients should be aware of the negative effects of exposure to dust and the physical/ psychological complications caused by dust exposure. People are required to know about the costs of dust

phenomenon and should know the ways to reduce its risks.

### Conflict of interest

None of the authors had any financial or personal *conflicts of interest* associated with this manuscript.

### Acknowledgments

This study was derived from a Ph.D. dissertation in Disaster and Emergency Health with the Ethics Code of No. IR.SSU.SPH.REC.1396.36 in School of Public Health, ShahidSadoughi University of Medical Sciences in Yazd. The researchers appreciate all the people who contributed to implementation of this research.

### Authors' contribution

M.M, M.A.M. wrote and discussed the manuscript, M.H.E., N.J.H, M.A.K. and H.F. edited MAM. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the analysis. All authors read and approved the final manuscript.

### References

- 1.Khazanehdary L. The Drought Landscape of future thirty year in the Iran. *Journal of Geography and Regional Development*. 2009;12:12-25.
- 2.Rasouli A SB, Mohammadi Gh. The evaluation of dust climatic phenomenon occurrence trend current years 55 in the west part of Iran by nonparametric statistical methods. *Quarterly of Physical Geography*. 2010;9:15-28.
- 3.Miller SD, Kuciauskas AP, Liu M, et al. Haboob dust storms of the southern Arabian Peninsula. *Journal of Geophysical Research: Atmospheres*. 2008; 113(D1).
- 4.Wang S, Yuan W, Shang K. The impacts of different kinds of dust events on PM 10 pollution in northern China. *Atmospheric Environment*. 2006;40(40):7975-82.
- 5.R.k. Trivedi PKG. *An Introduction to Air Pollution*: ABD Publishers 2010.
- 6.Al-Hurban AE, Al-Ostad AN. Textural characteristics of dust fallout and potential effect



- on public health in Kuwait City and suburbs. *Environmental Earth Sciences*. 2010;60(1):169-81.
7. Hong Y. A nationwide meeting summary of discussing Sand-dust Storm Weathers Occurred in China. *Journal of Gansu Meteorology*. 1993;11(3):6-11.
  8. Schlesinger P, Mamane Y, Grishkan I. Transport of microorganisms to Israel during Saharan dust events. *Aerobiologia*. 2006;22(4):259.
  9. Zarasvandi A, Moore F, Nazarpour A. Mineralogy and morphology of dust storms particles in Khuzestan Province: XRD and SEM analysis concerning. *Iranian Journal of Crystallography and Mineralogy*. 2011;19(3): 511-8.
  10. Shahsavani Abbas, Yarahmadi Maryam, Jafarzadeh haghhighifard Nematollah, Naeimabadi Aboulfazl, Mahmoudian mohammadHosayn, Saki Hamed, et al. Health and environmental effects of dust storms. *Journal of North Khorasan University of Medical Sciences*. 2011;2(4):45-56.
  11. Chen B, Kan H. Air pollution and population health: a global challenge. *Environmental health and preventive medicine*. 2008;13(2):94.
  12. Mohamadi S, Kaviannejad R. Crisis of air pollution and cardiovascular disease. 8th International Congress on Health in Emergencies and Disasters Tehran 22-24 April 2017. p. 80.
  13. Bennion P, Hubbard R, O'Hara S, Wiggs G, Wegerdt J, Lewis S, et al. The impact of airborne dust on respiratory health in children living in the Aral Sea region. *International journal of epidemiology*. 2007;36(5):1103-10.
  14. Tami D. Frequently Asked Questions: Dust Storms. In: Ecology WSDo, editor. 2014. p. 1-2.
  15. Noar SM. A health educator's guide to theories of health behavior. *International Quarterly of Community Health Education*. 2004;24(1):75-92.
  16. Prentice-Dunn S, L Floyd D, M Flournoy J. Effects of persuasive message order on coping with breast cancer information 2001. 81-4 p.
  17. Rogers RW. A Protection Motivation Theory of Fear Appeals and Attitude Change 1. *The Journal of psychology*. 1975;91(1):93-114.
  18. Donnal F, Steven P-D, W. RR. A Meta-Analysis of Research on Protection Motivation Theory. *Journal of Applied Social Psychology*. 2000;30(2):407-29.
  19. Wu Y, Stanton BF, Li X, Galbraith J, Cole ML. Protection motivation theory and adolescent drug trafficking: relationship between health motivation and longitudinal risk involvement. *Journal of pediatric psychology*. 2005;30(2):127-37.
  20. Sandelowski M. Sample size in qualitative research. *Research in nursing & health*. 1995;18(2):179-83.
  21. Polit-O'Hara D, Beck CT. *Essentials of nursing research: Methods, appraisal, and utilization*: Lippincott Williams & Wilkins; 2006.
  22. Sandelowski M. Telling stories: Narrative approaches in qualitative research. *Image: the journal of nursing scholarship*. 1991;23(3): 161-6.
  23. H F. Effect of intervention on reproductive health behavior change among HIV - AIDS on the health belief model. Tehran: Shahid Beheshti University of Medical Sciences; 2013.
  24. Graneheim UH, Lundman B. Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse education today*. 2004; 24(2): 105-12.
  25. Adib Hajbagheri M, Parvizi S, Salsali M. *Qualitative research methods*. Tehran, Iran: Boshra Publication. 2012.
  26. Corbin J, Strauss A. *Basics of qualitative research: Techniques and procedures for developing grounded theory*: Sage publications; 2014.
  27. Ramezankhani A, Doostifar K , Moteseddi zarandi S, et al. Evaluation of knowledge, attitude and protective behaviors of teachers against dust phenomenon based on the health belief model. *J Health Syst Res*. 2014;Health Education supplement(14): 1735-45.
  28. Praphant A, Health ČnCoP, Program ČnHSD. Preventive Behaviors Form Dust Among Workers in Lime Factories and Stone Crushing

- Mills, Nakhon Si Thammarat Province: Chulalongkorn University; 2003.
29. Winham DM, Jones KM. Knowledge of young African American adults about heart disease: a cross-sectional survey. *BMC Public Health*. 2011;11(1):248.
30. DeWitty V. Health beliefs and heart-healthy behaviors in African American women: Instrument development and validation. Washington D.C: George Mason University; 2007.
31. Yan Y, Jacques-Tiura AJ, Chen X, et al. Application of the protection motivation theory in predicting cigarette smoking among adolescents in China. *Addictive behaviors*. 2014;39(1):181-8.
32. Thrul J, Stemmler M, Bühler A, et al. Adolescents' protection motivation and smoking behaviour. *Health education research*. 2013; 28(4):683-91.
33. Taheri F, Forouzani M, Yazdanpanah M, et al. Farmers' Perceptions toward Dust Phenomenon: Case of Abadan County. *Iranian Journal of Agricultural Economics and Development Research* 2018;48(4):621-32.
34. Glanz K, Rimer BK, Viswanath K. *Health behavior and health education: theory, research, and practice*: John Wiley & Sons; 2008.
35. Babazadeh T, Tazval J, Moradijoo M, et al. Threat Appraisal of Skin Cancer in Farmers of Chaldoran County, 2014-2015. *Community Health journal*. 2016;10(1):40-51.
36. Ghasemi M, Sabzmakan L. Experiences of high school students about the predictors of tobacco use: A directed qualitative content analysis. *J Educ Community Health*. 2015; 2(3):1-11.