

Full Length Research Paper

Saudis trust and confidence in information sources about chemical pollution

Sami A. Zabin

Department of Science, Al-Baha University, P.O.Box 1560, Al-Baha, Kingdom of Saudi Arabia.
E-mail: samizabin12@yahoo.com, szabin@bu.edu.sa. Tel: +96677272489. Fax: +96677240254.

Accepted 6 December, 2010

The presence of toxic chemicals in the environment has drawn increasing concern in Saudi Arabia in recent years. Public health officials recognize a direct link between health problems and exposure to these chemicals. To communicate information on chemical pollution health risks effectively, policy makers must know population source of information and the confidence level in this information. This study investigated the Saudis ratings of different sources of information about health risks posed by chemicals pollution, confidence in these information sources, responsibility for public health risk protection and fulfillment. A written questionnaire designed and developed as a descriptive survey, which was distributed to a random sample of 850 individuals in Al-Baha region. The overall response rate was 68%. Data analyses were conducted using SPSS. Participants described receiving "a lot" of information from television and radio (38%) followed by the internet (35%), and friends and relatives (31%) with females rating these three sources higher than men. National and state environmental groups (2%), local community groups (3%) and private industry (4%) were the least rated sources. Respondents most frequently had "a lot" of confidence in medical doctors (39%) followed by television and radio (31%), and friends and relatives (15%). Responsibility for protecting the public from health risks was found to rest mainly on municipality health departments and province levels of government. It has been obvious that private industry and individual citizens had low responsibility for health risks. Greater than 70% of respondents felt that the fulfillment of responsibility was not adequate for all groups. This indicates that there is a defect in health risks communication and no substantial satisfaction with health risks management.

Key words: Information sources, health risk, confidence in source of information, responsibility for health protection.

INTRODUCTION

In recent years, there have been increasing strong public and professional concerns surrounding the potential impact of chemical pollution on health, and this has been reflected in many studies (Lee, 1986; Howel et al., 2003; Tilt, 2006; Boffeta, 2006; Robert et al., 2007; Azuma et al., 2007; Kishi, 2008). Toxic chemicals pose a threat throughout the world, because they endanger human health and those widely dispersed in the environment. In many cases, exposure to these chemicals is associated with a variety of acute and chronic diseases and disabilities that afflict human populations and many studies have demonstrated how exposure to chemical pollutants had adversely effected health and comfort (Muzi et al., 2004; Wang and Pinkerton, 2007; Kim and Bernstein, 2009). Indeed, air pollution due to chemicals

release has increased dramatically in the last few decades and can represent a major health hazard and cause an increase in mortality of the exposed population (Pope III et al., 2002).

In Saudi Arabia, air pollution has increased and became a major concern (Al-Rehaili, 2002). There is an increase in the formation of "Photochemical smog" in major cities of Saudi Arabia (Nasrallah and Seroji, 2007). Endocrine disrupting substances which comprise a wide variety of environmental contaminants including pesticides, industrial chemicals, pharmaceuticals, metals and natural compounds that may alter the normal functioning of endocrine systems in humans and animals are spread everywhere in the environment (Foster, 2001; Choi et al., 2004). The major sources of these chemicals are from

municipal effluents, intensive agriculture (pesticides), livestock production, industrial processing, and pulp and paper sector activity (Tyshenko et al., 2008).

Saudi society and its media and activists are not dealing with this chemical pollution seriously. One of the major reasons why people do not care about pollution is that they think of it as something unrelated to their life, probably because of their ignorance and lack of environmental education. Moreover, people disregard the fact that diseases that spread to everyone are a result of environmental degradation. Pollution remains absent from discussion, public debates, and media attention; and there is a silence of its intellectuals and its media towards pollution.

Environmental pollution health risks involve technical understanding of health risk, public perceptions, and the public influence. Public perception of health risk can be influenced by a wide range of factors, including media coverage, whether or not the hazard in question evokes feelings of dread, whether the issue is well understood, and correlate with personality type characteristics, (which is referred to as worldviews) (slovic, 1987; Dake, 1991) .

The public health professional must understand the needs of the community and be able to facilitate dialogue concerning the technical issues of public health risk. The policy makers, government environmental agencies and private organizations must respond to the public exposure concerns to hazardous substances in the environment. This is to provide a framework of principles and approaches for the communications of health risk information to diverse audiences (Feldman et al., 1998).

Health risk communication has played an integral part in many environmental agencies comprehensive efforts to prevent or mitigate adverse human health outcomes related to hazardous substance exposure. It is important that the information on environmental health risks reach the residents. To communicate this information effectively, policy makers must: (i) understand their attitudes, opinions, and perception of environmental health risks, (ii) know their source of information and the confidence level in this information, and (iii) responsibility for health risk protection and fulfillment (Krimsky and Plough, 1988; Johnson, 1993).

An important factor that shapes perception of risk from a hazard such as chemical pollution is trust or mistrust of the source of information, specifically technical information from the government regarding pollution (Kunreuther and Slovic, 1996). It is incumbent upon agencies to be viewed as trustworthy and credible so that the public perceives the information as believable. If individuals have trust in the source, then this information is used when making judgment about the hazard and lessens the risk perceived.

The converse is true if the information source cannot be trusted. In addition, if the industry or government risk managers have not been forthcoming about information releases, this inaction can damage industry's credibility, and any information provided later might increase risk

perception (Gibson, 2001).

If a history of mistrust exists between internal or external agencies and community, this mistrust influences the perception of risk when information regarding a hazard is provided. Therefore, agencies issuing information about a hazard or event must improve their credibility in the public's eye (May and Burger, 1996)

This study attempts to determine Saudis source of information and focus on the amount of information on health risks caused by chemical pollution respondents received from the list of possible source of information, and the degree of confidence they had in such information. In addition, the study attempts to identify the responsibility for protecting the Saudi public from health risks posed by chemical pollutants. Moreover, how well the different groups fulfill their responsibility to protect the public.

MATERIALS AND METHODS

Questionnaire design and administration

This survey is a follow-up to a previous survey of health risk perception among Saudis (Zabin, 2010). The questionnaire was designed and developed as a descriptive survey based on similar surveys (Thompson, 2002; Tiffany and Anne, 2002; Lehtonen and Pahkinen, 2003; Krewiski et al., 2006). The main components of the questionnaire were:

- (i) Introductory Demographics: The questionnaire begins with some brief demographics of the respondents, covering their age, gender, work, place of residence and education level. These data were required to weigh the sample to Al-Baha region population.
- (ii) Source of information on health risks and confidence in those sources: There were ten questions in this section. Respondents were asked to indicate the amount of information on health risks they received from the possible source of information and the degree of confidence they had in such information. The list of possible sources of information on health risks, such as news media (television and radio, newspapers and magazines), medical doctors, naturopaths, environmental groups, local community groups, municipal health department, friends and relatives, the internet and private industry.
- (ii) Responsibility to protect the public from health risks and fulfillment: There were seven questions in this section. This section addressed the public's perception of who holds responsibility for protecting the Saudi public from environmental health risks. Respondents were asked to rate the degree of responsibility they perceived each group to have, followed by how good a job was doing at fulfilling that responsibility.

The survey was conducted in Al-Baha Province - Saudi Arabia, which is situated in the south-west of the kingdom of Saudi Arabia with a population of 377,739 (CDSI, 2004).

The survey was conducted by distributing a written questionnaire to a random sample of people in Al-Baha region. It was self-administered and was distributed in native Arabic language to individuals of 18 years old and over and resident within the boundaries of Al-Baha region, during the period November 2007 to mid of May 2008.

The questionnaire was pilot tested prior to the main survey and adjustments were made to the survey tool to correct and clarify items for the final version following the pre-test.

Sources from which people received "a lot" of health risk

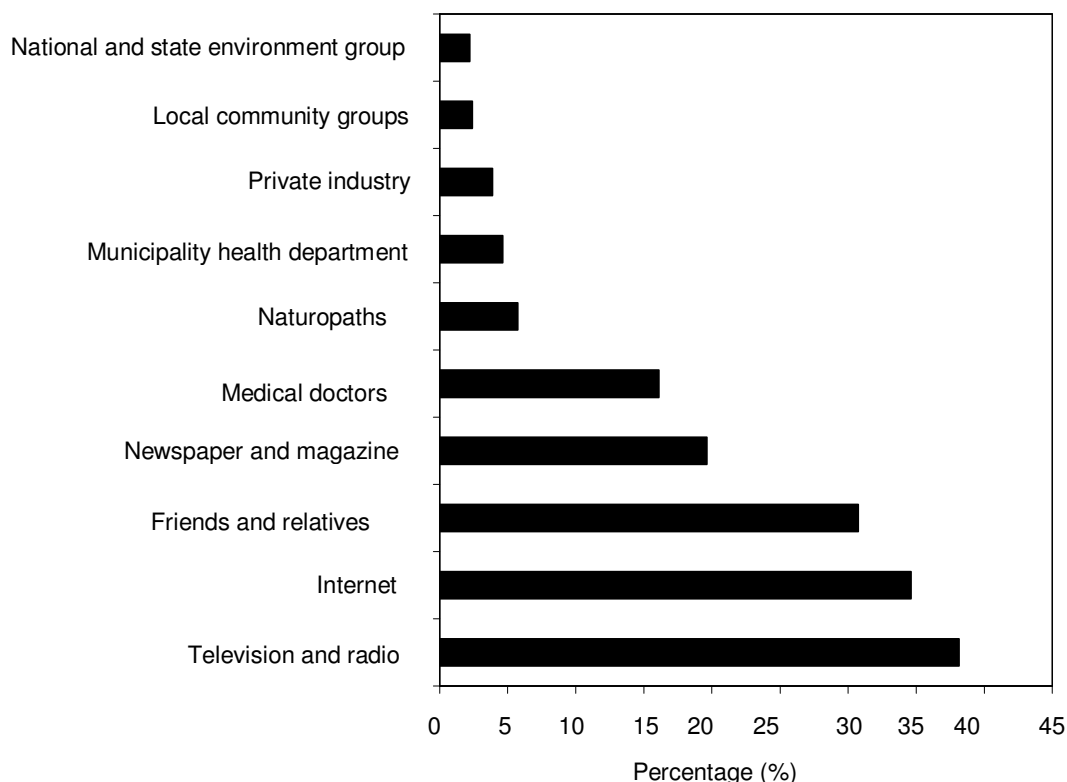


Figure 1. Sources from which people received "a lot" of health risk information.

Data analysis

Respondents were asked to indicate the amount of information about health risk issues they receive from ten different sources using a response scale ranging from 1= no information to 5= a lot of information; as well as their level of confidence in each information source on a scale ranging from 1=no confidence 5 = a lot of confidence. In addition, respondents were asked to rate the degree of responsibility and fulfillment. Each statement was rated on a response scale ranging from 1= none to 5 = a lot, and for fulfillment the scale was ranging from 1= poor to 5= excellent.

Descriptive statistics and all data analyses were conducted using Statistical Package for the Social Studies (SPSS) version 15.0.

The level of significance for all statistical tests was set at ($\alpha = 0.05$) as the criterion for tests of statistical significance. Frequencies, means, medians, and standard deviations were used to describe the participants and their responses on the survey instrument.

In this survey to examine the difference in responses with regard to gender, age groups, education, and place of residence descriptive statistics were used. However, to assess if differences exist on the subscale of responses, an independent samples t-test was performed on the subscale obtained from the survey questionnaire by gender, age range, education status, and place of residence. Initially, the assumption of equality of variances was tested with Levene's test. The appropriate significance was selected based on the results of Levene's test. Furthermore, for checking the different answers to questions between the independent variables a Bonferroni corrected p value of less than 0.001 was applied. A Bonferroni correction was applied to reduce the risk of making a Type1 error.

RESULTS AND DISCUSSION

Out of 850 questionnaires distributed, 578 respondents filled the questionnaire, which resulted in a response rate of 68%. Three hundred and sixteen participants were males (58.5%) and 224 were females (41.5%). The lower female participation is due to the customs and restrictions imposed on females in Saudi Arabia that make recruiting female candidates quite difficult.

Sources of information and confidence in information

Part two of the survey aimed at identifying where Saudi residents of Al-Baha province found their information on health risk issues, and how much confidence they had in these sources.

Respondents were asked how much information regarding health risk they obtained from a predetermined list of sources. Figure 1 shows the source of health risk information from which people received "a lot" of information. The most frequently used sources of information were television and radio followed by the internet and then friends and relatives. Overall 38% of the respondents received "a lot" of information about health issues and risks from TV and radio, and 35% from the

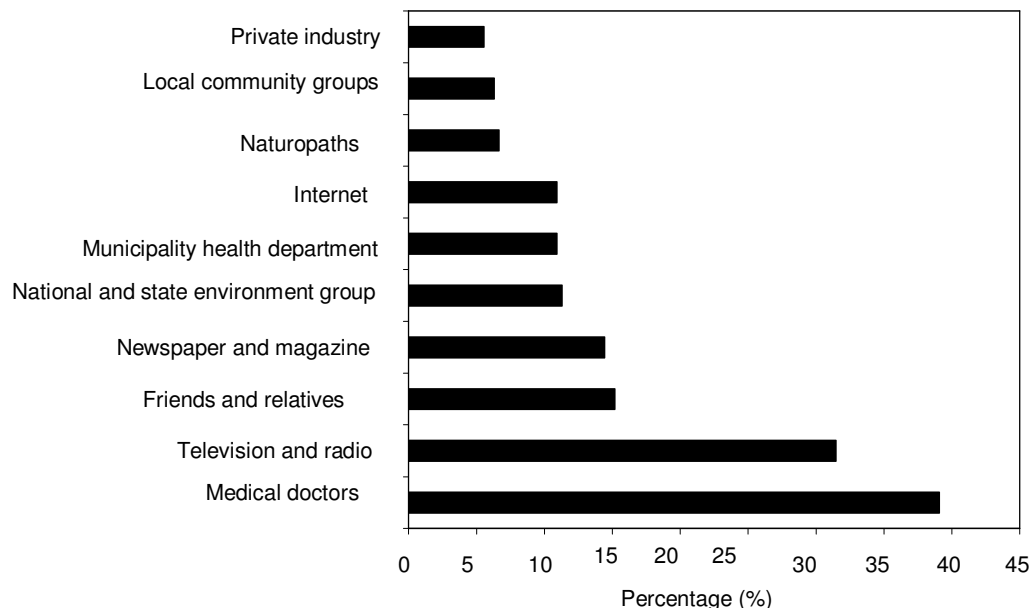


Figure 2. Source of information in which "a lot" of confidence is placed.

Internet. Friends and relatives (31%) were the next most used source, followed by newspapers and magazines (20%). The naturopaths, local community groups, private industry, and municipal health department were seen as sources of information by a very low percentage of respondents (6, 3, 4 and 5% respectively). The national and state environmental groups were the least used sources (2%).

On combining the categories "a lot" and "moderate", it could be seen that television and radio remains the most used sources (80%) followed by friends and relatives (71%), then newspapers and magazines (65%), while the internet (64%) falls back to fourth position with national and state government groups (14%) remaining the least used source.

The level of confidence shown by respondents in the information on health issues or risks received from the above sources did not appear to correspond with the amount of information they received. Only 31% of respondents placed a lot of confidence in the media (television and radio) as a source of information, despite its being the major source for 80% of respondents. Figure 2 reveals that 39% of respondents had "a lot" of confidence in medical doctors who, as a source of information, were viewed with more confidence than television and radio. The confidence level decreased for national and state environment groups, the municipality health department and the internet sources (all of them rated similarly 11%). Alternative therapists (naturopaths), local community groups and private industry were the least frequently reported sources from which respondents received information, and which were viewed as the source in which fewest respondents placed a lot of confidence.

From examination of the sources of "a lot" and "a moderate" amount of information combined, it was clear that people were receiving substantial amounts of information on health risks from multiple sources. Similarly when combining the "a lot" and "moderate" levels of confidence in sources, the highest level of confidence was placed in television and radio (79%) followed by medical doctors (73%), and friends and relatives (60%) as sources. Less confidence was seen in the municipal health department (37%), national and state environmental groups (29%), naturopaths (25%), local community groups (24.6%) and private industry (20%). There was no great difference between the level of confidence between the two highest categories, television and radio and medical doctors. The ranking of confidence level in sources of information remained the same whether or not they ranked singly as "a lot" or in combination with a "moderate". This is important for planning the dissemination of information.

The results showed that there is no difference in the order of confidence in the source of information between males and females.

Comparison of the results of this survey with the Canadian survey by Krewski et al. (2006) shows that the importance of the source of information about health risks issues varies slightly. However, this survey shows in accordance with Krewski et al. (2006) that the main sources of information about health risks are the media and medical doctors, while the smallest sources are private industry, local community groups and environmental groups.

Although the order of level of confidence in these sources varies slightly from the Canadian survey, the sources in which respondents have the most and least

confidence remain the same. In both studies respondents report most frequently report "a lot" of confidence in medical doctors, and the least amount of confidence in private industry (Krewiski et al., 2006).

Responsibility for health risk protection –degree and fulfillments

No single agency was perceived to bear "a lot" of responsibility for protecting the public from health risks. Medical doctors were thought to have "a lot" of responsibility to protect public health by 27% of participants, followed by municipal health departments for a further 23% of participants. Thirty eight percent of participants perceived that "a lot" of the responsibility for protecting public health rested on the combined municipal health departments and state levels of government. Local community groups, private industry and individual citizens were seen to have "a lot" of responsibility for protecting the public from health risks by 9, 10 and 10% of participants respectively. In general, there was low difference in order of rating all categories between males and females.

The answers obtained in part of the questionnaire which asked how well these groups were fulfilling their responsibilities to protect public health, showed that there is dissatisfaction with the way health risks are being managed. It was also observed that between 8 and 31% of participants did not answer this question. Greater than 70% of respondents felt that the fulfillment of responsibility was not adequate for all groups. Only 13% of respondents rated medical doctors as "excellent" in fulfilling their responsibility to protect the public from health risks, while 38% saw them to be "good". Fulfillment of this responsibility by medical doctors was seen to be "poor" by 24% of respondents. The municipal health department was rated poor by 49% and "excellent" by a very low 5%. In general, with the exception of medical doctors, greater number of respondents saw all agencies to be "poor" rather than "adequate" or "good" at fulfilling their responsibility to protect public health. These results indicate that improvement in health risks communication and management should be made by these groups.

Statistical analysis

Independent sample t-test used to examine if difference exists on the subscale in rating these sources of information and the confidence in the sources by the independent variables: gender (male and females), age (18 to 32, and above 32), education level (university degree, and without university degree), and place of residence (Al-Baha main city resident and residents of other areas in the province). Initially, the assumption of

equality of variances was tested with Levene's test. The appropriate significance was selected based on the results of Levene's test. Furthermore, for checking the different answers to questions between the independent variables a Bonferroni corrected p value of less than 0.001 was applied. A Bonferroni correction was applied to reduce the risk of making a Type 1 error. Tables 1 and 2 represent the results of the t-test.

Source of information and confidence in source of information

As regards to gender, males and females had statistically different answers to questions concerning (television and radio) and (municipal health department) as sources of information; and confidence in (television and radio) (newspapers and magazines), and (the internet) at an alpha level of 0.05 or p value of less than 0.025. Furthermore, males and females had different answers to questions concerning confidence in (television and radio) (newspapers and magazines), and (the internet) at a Bonferroni corrected p value of less than 0.001. Males and females did not have significantly different answers to any other questions.

To assess if differences exist on the subscale of information source and confidence in information by age range. Generally, the two different age groups had statistically different answers to questions (television and radio), (local community groups), (municipal health department), (the internet), and (private industry) as source of information at an alpha level of 0.05 or p value of less than 0.025. Furthermore, the two age groups had different answers to question (the internet) as source of information at a Bonferroni corrected p values of less than 0.001. The two different age groups did not have significantly different answers to the other questions.

Regarding the education level variable, the two different qualification groups had statistically different answers to questions concerning confidence (television and radio) and (newspapers and magazines) at an alpha level of 0.05 or p value of less than 0.025. The two different qualification groups did not have significantly different answers to the other questions.

In case of place of residence, the two different places of residence did have significantly different answers to question (local community groups) as source of information at an alpha level of 0.05 or a p value of 0.025 only.

Responsibility and fulfillment

From the present study, it was obvious that medical doctors, municipality health department, and government departments of environment were rated as having the greater responsibility, while private industry, individual

Table 1. Results of the independent samples t-test for source of information and confidence in information by gender, age group, qualification and place of residence.

Question	Gender			Age range			Qualification			Place of Residence		
	t	df	Significance	t	df	Significance	t	df	Significance	t	df	Significance
Question1a	-2.997	538	0.003	2.907	294.144	0.004	-0.194	538	0.846	1.737	538	0.083
Question1b	-5.183	535.421	0.000	-0.541	538	0.589	2.318	461.573	0.021	0.824	538	0.410
question2a	-2.117	499.666	0.035	0.044	538	0.965	1.517	470.165	0.130	1.014	538	0.311
Question2b	-3.979	496.808	0.000	-0.084	538	0.933	2.273	538	0.023	0.551	538	0.582
question3a	-1.241	538	0.215	0.241	361.133	0.809	-0.147	538	0.883	1.119	538	0.264
Question3b	-1.505	503.675	0.133	-0.298	538	0.766	-0.036	538	0.971	0.000	538	1.000
question4a	-0.137	538	0.891	1.592	358.674	0.112	-1.703	538	0.089	1.852	538	0.065
Question4b	-1.238	538	0.216	0.322	538	0.748	0.696	538	0.487	-0.087	538	0.931
question5a	0.730	538	0.466	0.993	379.411	0.321	-1.234	458.334	0.218	0.761	538	0.447
Question5b	0.883	538	0.378	-1.242	538	0.215	2.012	538	0.045	-1.210	538	0.227
question6a	0.501	538	0.616	2.463	362.317	0.014	-1.349	538	0.178	3.008	538	0.003
Question6b	2.130	538	0.034	1.258	538	0.209	-0.344	538	0.731	1.504	528.853	0.133
question7a	-2.406	446.149	0.017	3.269	379.338	0.001	-2.051	475.916	0.041	0.950	538	0.342
Question7b	-0.407	450.437	0.684	1.930	538	0.054	-1.338	538	0.182	-1.260	538	0.208
question8a	-0.464	538	0.643	1.771	538	0.077	1.380	538	0.168	-0.330	538	0.742
Question8b	-1.560	538	0.119	1.690	538	0.092	1.776	538	0.076	0.966	538	0.334
question9a	2.180	511.501	0.030	3.531	403.317	0.000	-2.019	470.199	0.044	-0.213	538	0.832
Question9b	3.924	500.490	0.000	2.112	538	0.035	-1.507	538	0.132	-0.327	538	0.744
question10a	-1.479	538	0.140	2.599	320.651	0.010	-0.806	538	0.421	0.999	538	0.318
Question10b	-0.695	538	0.487	0.832	538	0.406	-1.653	538	0.099	1.397	538	0.163

citizens and local community groups were seen as having the lowest level of responsibility for protecting the public.

To assess if differences exist on the subscale of responsibility for health risk and fulfillment by gender. Generally, males and females had statistically different answers to questions concerning responsibility (municipal health department), (state departments of environment), (private industry), (medical doctors), (local community groups), and (individual citizens) at an alpha level of 0.05. Furthermore, males and females had

different answers to questions concerning responsibility (municipal health department) and (state departments of environment) at a Bonferroni corrected p value of less than 0.001.

To assess if differences exist on the subscale of responsibility for health risk and fulfillment by age range. Generally, the two different age groups had statistically different answers to questions concerning responsibility (municipal health department) and (state departments of environment); and questions concerning fulfillment of (municipal health department), (state

departments of environment), (private industry) and (medical doctors) at an alpha level of 0.05 or p value of less than 0.025. Furthermore, the two age groups had different answers to question regarding fulfillment of (municipal health department) at a Bonferroni corrected p values of less than 0.001.

The two different educational levels did not have significantly different answers to any questions at an alpha level of 0.05.

On considering the place of residence variable, the analysis showed that the two different

Table 2. Results of the independent samples t-test for responsibility and fulfillment by gender, age range, qualification, and place of residence.

Question	Gender			Age range			Qualification			Place of residence		
	t	df	Significance	t	df	Significance	t	df	Significance	t	df	Significance
questionC1a	-5.263	538	0.000	2.644	538	0.008	0.302	538	0.762	0.094	538	0.925
questionC1b	-0.441	454.486	0.660	3.713	396.282	0.000	-1.399	477.766	0.162	0.867	535.140	0.386
questionC2a	-3.783	538	0.000	2.877	538	0.004	0.759	538	0.448	-2.449	533.791	0.015
questionC2b	0.415	538	0.678	2.820	384.421	0.005	-0.095	538	0.925	0.109	538	0.913
questionC3a	-2.986	433.258	0.003	1.400	538	0.162	0.276	406.499	0.783	-1.404	538	0.161
questionC3b	1.188	538	0.235	2.962	424.368	0.003	0.358	538	0.720	1.433	533.932	0.152
questionC4a	-3.338	496.529	0.001	0.715	538	0.475	0.552	538	0.581	0.240	538	0.810
questionC4b	-0.640	538	0.522	2.310	538	0.021	-1.468	538	0.143	2.129	538	0.034
questionC5a	-2.385	538	0.017	1.308	538	0.192	0.307	538	0.759	-0.843	538	0.400
questionC5b	2.162	538	0.031	0.884	375.553	0.377	-0.003	538	0.997	0.434	538	0.665
questionC6a	-1.956	538	0.051	1.321	312.328	0.188	0.604	538	0.546	0.701	538	0.484
questionC6b	2.002	538	0.046	1.497	389.349	0.135	0.025	538	0.980	0.141	538	0.888
questionC7a	-3.090	538	0.002	1.677	538	0.094	-0.038	538	0.970	1.102	538	0.271
questionC7b	-2.182	443.665	0.030	1.885	371.199	0.060	-0.337	538	0.736	2.465	538	0.014

places of residence did have significantly different answers to questions concerning responsibility (state departments of environment) and fulfillment of (individual citizens) at an alpha level of 0.05 or a p value of 0.025. Neither question was significant at a Bonferroni corrected p value of less than 0.001.

Conclusion

The results of the survey show that the most used sources of information are the broadcast media (television and radio) followed by internet and then friends and relatives. The confidence shown by respondents in the information on health issues or risks that they received from different sources did not correspond much with the amount of information received. The survey showed that

Saudi public has higher confidence in medical doctors followed by television and radio as sources of information. Responsibility for protecting the public from health risks was found to rest mainly on municipal health departments and state levels of environmental departments.

The survey showed that there is no substantial satisfaction with the way health risks are being managed. Greater than 70% of respondents felt that the fulfillment of responsibility was not adequate for all groups. This indicates that there is a defect in health risks communication and management in these groups.

ACKNOWLEDGEMENTS

I am greatly obliged to the Dean, Faculty of Education, Al Baha University, for his continuous

help and encouragement and for the supporting letter for distribution of the questionnaire. I thank each of the Saudi respondents at Al-Baha region, without the contributions of their views, this project would not have been possible. To them all, I remain very grateful.

REFERENCES

- Al-Rehaili AM (2002). Outdoor-indoor air quality in Riyadh: SO₂, NH₃, and HCHO. *Environ. Monitoring Assessment*, 79: 287-300.
- Azuma K, Uchiyama I, Ikeda K (2007). The risk of screening for indoor air pollution chemicals in Japan. *Risk Anal.*, 27(6): 1623-1638.
- Boffetta P (2006). Human cancer from environmental pollutants: The epidemiological evidence. *Mutation Res. Genet. Toxicol. Environ. Mutagenesis*, 608(2): 157-162.
- Central Department of Statistics and Information (CDSI) (2004). Ministry of Economics and Planning; Saudi Arabia at website:

<http://www.cdsi.gov.sa/showproductstandard.aspx?lid=26&pid=1439>.

Accessed on June 18, 2007.

- Choi SM, Yoo SD, Lee BM (2004). Toxicological characteristics of endocrine-disrupting chemicals: Developmental toxicity, carcinogenicity and mutagenicity. *J. Toxicol. Environ. Health*, B7: 1-24.
- Dake K (1991). Orienting dispositions in the perception of risk: An analysis of contemporary worldviews and cultural biases. *J. Cross-Cult Psychol.*, 22: 61-82.
- Feldman DL, Hanahan RA, Joslin D (1998). Public use risk information in environmental decisions: Lessons from three cases. JIEE report No. 98-07 (prepared for the U.S. EPA, National Centre for Environmental Assessments), Washington D.C.
- Foster W (2001). Endocrine disrupting and human reproductive effects: An overview. *Water Qual. Res. J. Can.*, 36: 253-271.
- Gibson G (2001). First Nation Perspectives on the Alberta Special Waste Treatment Centre of Swan Hills, pp. 1-15.
- Howel D, Moffatt S, Bush J, Dunn CE, Prince H (2003). Public views on the links between air pollution and health in northeast England. *Environ. Res.*, 91: 163-171.
- Johnson BB (1993). "The mental model" meets "the planning process": Wrestling with risk communication research and practice. *Risk Anal.*, 13(1): 5-8.
- Kim H, Bernstein JA (2009). Air pollution and allergic disease. *Curr. Allergy Asthma Rep.*, 9(2): 128-133.
- Kishi R, Sata F, Yoshioka E, Ban S, Sasaki S, Konishi K, Washino N. (2008). Exploiting gene-environment interaction to detect adverse health effects of environmental chemicals on the next generation. *Basic Clin. Pharmacol. Toxicol.*, 102(2): 191-203.
- Krewski D, Lemyre L, Turner MC (2006). Public perception of population health risks in Canada: Health hazards and sources of information. *Human Ecol. Risk Assess.*, 12: 626-644.
- Krimsky S, Plough A (1988). *Environmental hazards. Communicating risks as a social process.* Dover, Auburn House. ISBN: 0-86569-187-8.
- Kunreuther H, Slovic P (1996). Science, values, and risk. *Am. Assoc. Polit. Soc. Sci.*, 545: 116-125.
- Lee TR (1986). Public attitudes towards chemical hazards. *Sci. Total Environ.*, 51: 125-147.
- Lehtonen R, Pahkinen E (2003). *Practical Methods for Design and Analysis of Complex Surveys*, Wiley.
- May H, Burger J (1996). Fishing in a polluted Estuary: Fishing behavior, fish consumption, and potential risk. *Risk Anal.*, 16:459-471.
- Muzi G, dell'Omo M, Murgia N, Abbritti G (2004). Chemical pollution of indoor air and its effects on health. *Giornale italiano di medicina del lavoro ed ergonomia*, 26(4):364-369.
- Nasrallah MM, Seroji AR (2007). Primary pollutants and potential photochemical smog formation in Makkah, Saudi Arabia. *Arab Gulf J. Sci. Res.*, 25(4): 153-161.
- Pope III CA, Burnett RT, Thun MJ (2002). Lung cancer, cardiopulmonary mortality, and long-term exposure to fine particulate air pollution. *JAMA*, 287: 1132-1141.
- Robert G, David OC, Donald K (2007). Meeting report: Threats to human health and environmental sustainability in the pacific basin. *Environ. Health Perspect.*, 115(12): 1770-1775.
- Slovic P (1987). Perception of Risk. *Sciences*, 236: 280-285.
- Thompson SK (2002). *Sampling (2nd edn.)*, Wiley, ISBN: 978-0-471-29116-9.
- Tiffany G, Anne T (2002). *Environmental Health and Wellbeing Survey.* Prepared for: Environmental Health Branch, Department of Human Services. Centre for Population Studies in Epidemiology, South Australian Department of Human Services, Australia.
- Tilt B (2006). Peter K. New Award Winner, 2004: Perceptions of risk from Industrial pollution in China: A comparison of occupational groups. *Human Organ.*, 65(2): 115-127.
- Tyshenko MG, Philips KP, Mehta M, Poirier P, Leiss W (2008). Risk Communication of endocrine-disrupting chemicals: Improving knowledge translation and transfer. *J. Toxicol. Environ. Health, Part B*, 11(3): 345-350.
- Wang L, Pinkerton KE (2007). Air pollutant effects on fetal and early postnatal development. *Birth Defects Research, Part C, Embryo Today: Rev.*, 81(3): 144-154.
- Zabin SA (2010). Saudi Attitudes toward Chemical Pollution of the Environment, Al Baha Region, Saudi Arabia. *Human and Ecological Risk Assessment: Int. J.*, 16(5): 1169-1183.