



## Risk perception of outdoor security personnel on urban air pollution in Iligan City

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### Abstract

This study was conducted in order to gauge the knowledge and perceptions of outdoor security personnel towards air pollution with the use of questionnaire guided interview. A total of 32 recruited security guards based in Iligan City comprised the study population. According to the data gathered, a significant number of respondents (87.5%) claimed to be aware of air pollution. Unfortunately, there were several misconceptions on the causes and effects of air pollution. Despite the claims of respondents of their awareness of air pollution, particularly on its effects to the health and environment, a number of security guards have not practiced any precautionary measures.

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## Introduction

The World Health Organization (WHO) reported in 2012 about seven million have died as result of air pollution exposure. An estimate of one out of eight total global deaths, twice the previous estimate of WHO asserts that air pollution is presently world's largest single environmental health risk (Anderson *et al.*, 2012; Smith *et al.*, 2014; World Health Organization, 2014; Molina *et al.*, 2015).

Air pollution has long been a global concern which causes hazardous effects to human health: exacerbation of respiratory and cardiovascular diseases and may also cause diseases in the nervous system (Gene *et al.*, 2012; Guerreiro, Foltesco and Leeuw 2014).

These lead different organizations, such as the WHO to create standards which would protect the health of the public. However, the effectiveness of the movement to protect the health of the people, which organizations have tried to attain, mainly depends on the perception of the population towards air pollution. Gauging the knowledge, attitude, perception and practice of people towards air pollution, then becomes vital in creating a better intervention program and individual involvement (Lubell *et al.*, 2006; Stoughtenborough and Vedlitz, 2014).

Due to the urbanization of Iligan City, a boom of businesses were established, thus, creating a higher demand for security personnel whose job entail the safety of the citizens and their properties (Unnithan, 2013).

These outdoor security personnel are highly and constantly exposed to traffic-related air pollutants. It therefore essential to assess their understanding and perception on air pollution.

## Materials and methods

### *Study area and population*

The study was conducted in Iligan City, Philippines, which is the second largest city of Northern Mindanao

(National Statistical Information Center, 2008). Outdoor male security personnel, who were worked in establishments situated in traffic-laden areas were asked to participate in the study. Convenient sampling was used in recruiting participants in this study. The participating security guards were asked to sign a consent form in order to ensure the confidentiality of their identities.

### *Questionnaire-Guided Interview*

The security personnel that were recruited at the beginning of the study were interviewed with a questionnaire as a guide. The interview included their knowledge, perception, attitude and practices towards air pollution. Questions included in the questionnaire was taken from the study of De Giusti *et al.* (2012) and de Bono *et al.* (2010). The interview aimed to gauge the knowledge of the security personnel on the basics on air pollution, perception, attitude and practices in connection with air pollution.

### *Data analysis*

Basic statistical tools such as mean, median, and mode as well as Fisher's Exact Test and Mid P Test for *p*-value determination were used to analyze and make inferences from the gathered data.

## Results and discussion

A total of 32 outdoor security personnel of Iligan City agreed to be the subjects. The demographic summary of the recruited population is shown in Table 1. More than half of the respondents (22 subjects) are married and were mostly non-natives of Iligan City (27 subjects) having relocated to the area for employment reasons.

### *Knowledge and awareness of pollution*

According to the data gathered, 26 respondents (81.25%) claimed to have heard about pollution and believed that it is harmful to the environment. Twenty-five out of the 26 respondents (96.15%) claimed to have known that pollution could harm people's health as shown in Table 2.

**Table 1.** Sociodemographic data of the study population.

Variables	Percentage (%)		Mean ± SD	
Age (in years)	9	(28.13)	35.36 ±	8.11
20-29	13	(40.63)	35.36 ±	8.11
30-39	8	(25.00)	35.36 ±	8.11
40-49	2	(6.250)	35.36 ±	8.11
50-54				
Educational Attainment				
High School	13	(40.63)	---	
Vocational	7	(21.88)	---	
College	2	(6.250)	---	
Marital Status				
Married	22	(68.73)	---	
Single	9	(28.13)	---	
Cohabit	1	(3.125)	---	
Number of years as security personnel				
>2	8	(25.00)	7.00 ±	6.72
3-5	9	(28.13)	7.00 ±	6.72
6-10	7	(21.88)	7.00 ±	6.72
10<	8	(25.00)	7.00 ±	6.72
Did not disclose the information	2	(6.250)	7.00 ±	6.72

In a book written by Harrison (2001), he differentiated contamination and pollution and clarified that contaminations occurs when in a sample there exist chemicals but it does not have any detrimental effects. On the other hand, pollution is defined as the presence of chemicals in a level that causes harm. The most predominant perception on pollution in this study is the act of poisoning by contaminating the environment, using man-made waste, as stated by 10 (38.46%) of the respondents, followed by 7 (26.92%) respondents who claim that it has several types and it causes harm to the environment.

These claims were affirmed by several references which state that pollution is also further classified into different types, the most common classification includes water, radioactive and air pollution (Harrison, 2001; Maczulak, 2010; Vesilind *et al.*, 2013).

Two of the respondents (7.69%) are not sure of what pollution is and even seven respondents (26.92%) reported that they do not have any knowledge about pollution.

*Knowledge and awareness of air pollution*

Twenty-eight respondents (87.5%) reported to have heard of air pollution, while four respondents (12.5%) said that they have not hear of air pollution. Air pollution is a process of rendering an environment by natural of man-made chemical, physical or biological agents which alters the properties of the atmosphere (Stern *et al.*, 2014; WHO, 2016).

In the survey, 15 respondents (53.57%) said that air pollution is a contamination in the air and 14 (50%) claimed that it is harmful to human health and to the environment (Table 3). Furthermore, it was found out that seven (25%) do not know anything about air pollution.

It is then logical to assume that several individuals of the study population have heard of air pollution but did not necessarily have the correct concept of air pollution. In a similar study in Nairobi slums in

Kenya, only 20% of the respondents have sufficient knowledge on air pollution (Egondi *et al.*, 2013). Results obtained thus prompts the need of air pollution education in developing countries.

**Table 2.** Knowledge and awareness of the study population about general pollution.

Criteria	N=32	%	p-value*
Awareness of pollution	26	81.25	<0.0000001
Believes pollution is harmful			
To the environment	26	100	2.00
To people's health	25	96.15	<0.0000001
Perceptions of pollution			
The act of poisoning by contaminating the environment using man-made waste	10	38.46	<0.0000001
It has several types and harms the environment and humans	7	26.92	<0.0000001
No knowledge about on air pollution	7	26.92	<0.0000001
The process of making land, water air, etc. dirty and not safe or suitable to use	5	19.23	<0.0000001
Not sure what pollution is	2	7.69	<0.0000001
It purifies the environment	1	3.85	<0.0000001
Has knowledge of the different types of pollution	9	34.62	<0.0000001

\*p-value used in Binomial Proportion, Normal Theory Method with confidence interval of 95%.

Eighteen respondents (64.29%) of this study believes that exhaust from motor vehicles is one of the major causes of air pollution. Another 14 respondents (50%) pointed out that industrial sources or power plants are major contributors to air pollution. The result obtained is similar to the study conducted in Kenya (Omanga *et al.*, 2014) of which 80% of all the respondents blame the industrial pollution as the main causative agent of air pollution. Other possible sources cited by the respondents are summarized in Table 3. A similar epidemiological study conducted by Liao *et al.*, (2015) in China published results of which 78.5% and 56.3% of the 989 residents interviewed claimed that motor vehicles and burning of wastes, respectively, are major contributors to air pollution. Approximately 67.86% of the security personnel claimed that they do not know any air pollutants present in the atmosphere. The rest of the population said that fumes and smoke (32.41%), dust particles (25%) and particles from trash/garbage (21.43%) are air pollutants.

Lawan and cohorts (2010) also have parallel survey results in Kano, Northwestern Nigeria, of which 74% and 68.7% of all 335 eligible respondents believe that exhaust fumes and dust particles are also major contributors to air pollution.

There are a lot of evidence that shows that air pollution presents a greater burden to the morbidity and mortality of the society due to a wide range of diseases it causes (Laumbach and Kipen, 2012; Pascal *et al.*, 2013; Shah *et al.*, 2013). Twenty-two individuals of the study population (79%) believed that air pollution causes infection and inflammation of the upper respiratory tract, 16 respondents (57.14%) believed that it causes chronic and acute respiratory disorders and 11 respondents (39.29%) said it causes heart diseases. Only four respondents (14.29%) claimed not to know any health effects of air pollution.

**Table 3.** Knowledge and awareness of air pollution among the study population.

Criteria	N=32	%	p-value*
Awareness of air pollution	28	87.50	<0.0000001
Knowledge on air pollutants	13	46.42	<0.0000001
Perception on air pollution			
A contamination in the air	15	53.57	<0.0000001
It is harmful to health and environment	14	50.00	<0.0000001
Air contains gases, dust, fumes in harmful amounts	8	28.57	<0.0000001
Do not know anything about air pollution	3	10.71	<0.0000001
Substance is introduced into the air and cause harmful effects	4	14.29	<0.0000001
It destroys the soil and water ecosystems	2	7.14	<0.0000001
Possible causes of air pollution			
Exhaust from motor vehicles	18	64.28	<0.0000001
Industrial sources/power plants	14	50.00	<0.0000001
Smoke of cigarettes	10	35.71	<0.0000001
Waste disposal	10	35.71	<0.0000001
Burning of waste	7	25.00	<0.0000001
Do not know any possible cause	5	17.86	<0.0000001
Population growth	3	10.71	<0.0000001
Dust	8	28.57	<0.0000001
Garbage/Trash	6	21.43	<0.0000001
Carbon monoxides	4	14.29	<0.0000001
Air pollution can cause health risks	28	100.0	<0.0000001
Effects of air pollution to the health of the people			
Infection and inflammation of the respiratory tract	20	71.43	<0.0000001
Chronic and acute respiratory disease	14	50.00	<0.0000001
Heart disease	11	39.29	<0.0000001
Cancer	5	17.86	<0.0000001
Prevent uptake of oxygen	4	14.29	<0.0000001
Do not know any health effect	4	14.29	<0.0000001
Other effects of air pollution aside from harming human health			
Damage to animals	8	28.57	<0.0000001
Damage to environment	7	25.00	<0.0000001
Damage to plants	6	21.42	<0.0000001
Damage to economy	5	17.86	<0.0000001
Acidification	2	7.140	<0.0000001
Presence of ground level ozone	2	7.140	<0.0000001
Not sure	1	3.570	<0.0000001

\*p-value used in Binomial Proportion, Normal Theory Method with confidence interval of 95%.

In the study conducted by Obafemi (2013), the respondents reported that respiratory infections such as cough (44.7%), asthma (10.5%) as well as cancer (35.5%) are effects of air pollution.

Apart from the impacts of the air pollution to human health, the respondents were asked if they were aware of other effects of air pollution of which eight respondents (28.57%) reported that air pollution also attributes to the deteriorating health of the animals in the environment (Table 3).

Seven respondents (25%) reported that it causes damage to the environment and six (21.42%) of them claimed that air pollution can damage plants. Five respondents (17.86%) reported that air pollution causes great damage to the economy.

**References**

**Anderson JO, Thundiyil JG, Stolbach A.** 2012. Clearing the air: a review of the effects of particulate matter air pollution on human health. *Journal of Medical Toxicology* **8(2)**, 166-175. <http://dx.doi.org/10.1007/s13181-011-0203-1>.

- De Bono JS, Oudard S, Ozguroglu M, Hansen S, Machiels JP, Kocak I, Gravis G, Bodrogi I, Mackenzie MJ, Shen I, Roessner M.** 2010. Prednisone plus cabazitaxel or mitoxantrone for metastatic castration-resistant prostate cancer progressing after docetaxel treatment: a randomized open-label trial. *The Lancet*, **376(9747)**, 1147-1154. [https://doi.org/10.1016/S0140-6736\(10\)61389-X](https://doi.org/10.1016/S0140-6736(10)61389-X)
- De Giusti M, Corrao C, Mannocci A, Palazzo C, Riccardi R, Schmidt SL, Sernia S, La Torre G.** 2012. Occupational biological risk knowledge and perception: results from a large survey in Rome Italy. *Annali dell'Istituto superiore de sanita* **48(2)**, 138-145. [https://10.4415/ANN\\_12\\_02\\_06](https://10.4415/ANN_12_02_06)
- Egondi T, Kyobutungi C, Ng N, Muindi K, Oti S, Vijver SVD, Ettarh R, Rocklov J.** 2013. Community perceptions of air pollution and related health risks in Nairobi slums. *International Journal of Environmental Research and Public Health* **10(10)**, 4851-4868. <https://doi.org/10.3390/ijerph10104851>
- Gene S, Zadeoglulari Z, Fuss SH, Gene K.** 2012. The adverse health effects of air pollution on the nervous system. *Journal of Toxicology*, 782462. <http://dx.doi.org/10.1155/2012/782462>.
- Guerreiro CB, Foltescu V, de Leeuw F.** 2014. Air quality status and trends in Europe. *Atmospheric Environment* **98**, 376-384. <https://doi.org/10.1016/j.atmosenv.2014.09.017>.
- Harrison R.** 2001. *Pollution. Causes, Effects and Control. Fourth Edition.* The Royal Society of Chemistry. ISBN 0-85404-621-6.
- Laumbach RJ, Kipen H.** 2012. Respiratory health effects of air pollution: update on biomass smoke and traffic pollution. *Journal of Allergy and Clinical Immunology* **129(1)**, 3-11. <https://10.1016/j.jaci.2011.11.021>.
- Lawan, UM, Iiyasu Z, Abubakar AA, Alausa OK.** 2010. Health Risks Associated with Air Pollution: Public Perception in Kano, Northwestern Nigeria. *Ebonyi Medical Journal* **9(1)**. <http://dx.doi.org/10.4314/ebomed.v9i1.62467>
- Lubell M, Vedlitz A, Zahran S, Alston LT.** 2006. Collective Action, Environmental Activism, and Air Quality Policy. *Political Research Quarterly* **59(1)**, 149-160. <https://10.1177/106591290605900113>
- Maczulak A.** 2010. *Pollution. Treating Environmental Toxins.* ISBN-13: 978-0816072026.
- Molina LT, Gallardo L, Andrade M, Baumgardner D, Borbor-Cordova M, Borquez R, Casassa G, Cereceda-Balic F, Dawidowski I, Garreaud R, Huneeus N.** 2015. Pollution and Its Impacts on the South American Cryosphere. *Earth's Future* **3(12)**, 345-369.
- National Statistical Information Center.** 2008. Iligan City (The City of Majestic Waterfalls): Physical Profile. Retrieved from: [www.nscb.gov.ph/ru10/profile/iligan/3\\_physicalprofile.html](http://www.nscb.gov.ph/ru10/profile/iligan/3_physicalprofile.html)
- Obafemi AA, Eludoyin OS, Akibosola BM.** 2013. Public Perception of Environmental Pollution in Warri, Nigeria. *Journal of Applied Sciences and Environmental Management* **16(3)**, 233-240.
- Omanga E, Ulmer L, Berhane Z, Gatari M.** 2014. Industrial air pollution in rural Kenya: community awareness, risk perception, and associations between risk variables. *BMC Public Health* **14**, 377. <https://doi.org/10.1186/1471-2458-14-377>.
- Pascal M, Corso M, Chanel O, Declercq C, Badaloni C, Cesaroni G, Henshel S, Meister K, Haluza D, Martin-Olmedo P, Medina S.** 2013. Assessing the public health impacts of urban air pollution in 25 European cities: Results of the Aphekom project. *Science of the Total Environment* **449**, 390-400. <https://10.1016/j.scitotenv.2013.01.077>

**Shah AS, Langrish JP, Nair H, McAllister DA, Hunter AL, Donaldson K, Newby DE, Mills NL.** 2013. Global association of air pollution and heart failure: a systematic review and meta-analysis. *The Lancet* **382(9897)**, 1039-1048.

[https://doi.org/10.1016/S01406736\(13\)60898-3](https://doi.org/10.1016/S01406736(13)60898-3).

**Smith KR, Bruce N, Balakrishnan K, Adair-Rohani H, Balmes J, Chafe Z, Dherani M, Hosgood HD, Mehta S, Pope D, Rehfuess E.** 2014. Millions dead: how do we know and what does it mean? Methods use in the comparative risk assessment of household air pollution. *Annual review of Public Health* **35**, 185-206.

<http://dx.doi.org/10.1146/annurev-publhealth-032013-182356>.

**Stoutenborough JW, Vedlitz A.** 2014. The effect of perceived and assessed knowledge of climate change on public policy concerns: an empirical comparison. *Environmental Science and Policy* **37**, 23-33.

<http://dx.doi.org/10.1016/j.envsci.2013.08.002>

**Unnithan NP (Editor).** 2013. *Crime and Justice in India*. Sage Publications India.

**Vesilind PA, Pierce JJ, Weiner R.** 2013. *Environmental Pollution and Control*. Third Edition. Butterworth-Heinemann. ISBN 0-409-90271-1.

**World Health Organization.** 2014. 7 million premature deaths annually linked to air pollution. World Health Organization, Geneva Switzerland. Retrieved from:

[www.who.int/mediacentre/news/releases/2014/air-pollution/en/](http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/)

**World Health Organization.** 2016. Air pollution. Retrieved from:

[www.who.int/topics/air\\_pollution/en](http://www.who.int/topics/air_pollution/en)