

Letter to the Editor: Applications Air Q Model on Estimate Health Effects Exposure to Air Pollutants

Gholamreza Goudarzi^a, Sahar Geravandi^{b,c}, Elaheh Jame Porazmey^d, Mohammad Javad Mohammadi^{e,f,c*}

^aDepartment of Environmental Health Engineering, School of Public Health And Environmental Technologies Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

^bDepartment of Nursing, Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran.

^cRazi Teaching Hospital, Clinical Research Development Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

^dResearch Center for Environmental Pollutants, Qom University of Medical Sciences, Qom, Iran.

^eDepartment of Environmental Health Engineering, School of Public Health And Environmental Technologies Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

^fAbadan School of Medical Sciences, Abadan, Iran.

*Correspondence should be addressed to Mr. Mohammad Javad Mohammadi, **Email:** Mohamadi.m@ajums.ac.ir – javad.sam200@gmail.com

Article Notes: Received: Nov 24, 2015; Accepted: Dec 10, 2015; Available Online: Dec 23, 2016

Please cite this article as: Goudarzi G, Geravandi S, Jame porazmey E, Mohammadi MJ. Letter to the Editor: Applications air q model on estimate health effects exposure to air pollutants. Arch Hyg Sci 2016;5(1): 61-63.

Keywords: Air Q model; Health; Air Pollutants; Environmental Pollutants; Iran.

Definition and Classifications

Epidemiologic studies in worldwide have measured increases in mortality and morbidity associated with air pollution (1-3). Quantifying the effects of air pollution on the human health in urban area causes an increasingly critical component in policy discussion (4-6). Air Q model was proved to be a valid and reliable tool to predicts health effects related to criteria pollutants (particulate matter (PM), ozone (O₃), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), and carbon monoxide (CO)), determinate the potential short term effects of air pollution and allows the examination of various scenarios in which emission rates of pollutants are varied (7,8). Air Q software provided by the WHO European Centre for Environment and Health (ECEH) (9). Air Q model is based on cohort studies and used to estimates of both

attributable average reductions in life-span and numbers of mortality and morbidity associated with exposure to air pollution (10,11).

Applications

In recent years, Air Q model focuses on the use of epidemiologic methods and data for estimates the impacts of specific air pollutants on resident population in a certain area and period. Air Q model is based on statistical equations and it's was on gravimetric basis (2,8).

Air Q model includes four screen inputs (supplier, AQ data, location, and parameter) and two output screens (table and graph) (5,7). For estimation of health impact attributable to the exposure of air pollution on the target population, data measurement in monitoring stations processing by Excel software includes; primary processing (the deletion, spreadsheet,

synchronization), secondary processing (writing code, condition correction, formulation, filtering), modifications, and after the impact of meteorological parameters (temperature, pressure) was converted as input file to the model (5,7). This model for health impact assessments utilizing Attributable Proportion (AP), Relative Risk (RR), Baseline Incidence (BI) and Years-of-Life-Lost (YLL) related to health effects pollutants (4,6). Term of AP in percentage was calculated as following formula:

$$AP = \frac{\sum \{[RR(c)-1] p(c)\}}{\sum [RR(c) p(c)]}$$

Where: Relative risk (RR) is the risk of an event (or of developing a disease) relative to exposure (2,5).

RR = Incidence in the exposed / Incidence in the non exposed

(2,5). Therefore number of each case per unit of population which is caused by air pollutants exposure can be estimated as:

$$IE = I \cdot AP$$

If size of population is known, the number of cases attributable to the exposure will be estimated as the following equation:

Where: NE is the estimated number of cases attributed to the exposure. N indicates the size of the investigated population (4,6).

Attributable proportion was multiplied at baseline incidence and divided to 105. Obtained value should be multiplied at population (106as population) (4,6). The results will be the excess cases of health endpoint attributed to air pollutants.

Significant Issues

Air Q model are susceptible to health endpoint. The main matters of models morbidity and mortality are precipitation of AR, RR and BI (10). For example, high amount of RR increase number of disease and death attributed to pollutants. In addition, RR, AR and YLL were reduced by decrease air

pollutants concentration (8). Therefore, reduced exposures of people to in urbane area with air pollutants require pollution prevention, limiting emissions and careful monitoring of air pollution (2,5). The other significant issue of Air Q model facilities is calculating indicators AP and RR amounts with additional cohort studies.

The Future

According to process, industries and further duration of polluted air in the urban air expected to increase utilizing health model in future in the world. It is due to the increase of population, urbanization of coastal and arid areas, increasing contamination of air pollutants, dust storm, urban traffic, increase emissions pollutants. There is still high need to further studies to specify local RR and BI. Thus, further studies that would allow assessing the development in health status are necessary.

Conclusions

The effectiveness of health model in estimate health endpoint has now become one of the most reliable standard techniques to obtain calculating effects air pollutants. Therefore, It is recommended that the Iranian ministry health should study the possibility of utilizing a development model for evaluate effects criteria pollutants in air metropolitan.

Authors' Contributions

Mohammad Javad Mohammadi, Gholamreza Goudarzi, Sahar Geravandi, Esmaeil Idani and Elaheh Jame porazmey made extensive contributions into the review and finalization of this manuscript.

References

1. Geravandi S, Goudarzi G, Babaei AA, Takdastan A, Mohammadi MJ, Vosoughi Niri M, et al. Health Endpoint Attributed to Sulfur Dioxide Air Pollutants. *Jundishapur J Health Sci* 2015;7(3):e29377.

2. Goudarzi G, Geravandi S, Foruozaandeh H, Babaei AA, Alavi N, Niri MV, et al. Cardiovascular and respiratory mortality attributed to ground-level ozone in Ahvaz, Iran. *Environ Monit Assess* 2015;187(8):487.
3. Zallaghi E, Geravandi S, Nourzadeh Haddad M, Goudarzi G, Valipour L, Salmanzadeh S, et al. Estimation of Health Effects Attributed to Nitrogen Dioxide Exposure Using the AirQ Model in Tabriz City, Iran. *Health Scope* 2015;4(4):e30164.
4. Geravandi S, Goudarzi G, Mohammadi MJ, Taghavirad SS, Salmanzadeh S. Sulfur and Nitrogen Dioxide Exposure and the Incidence of Health Endpoints in Ahvaz, Iran. *Health Scope* 2015;4(2):e24318.
5. Geravandi S, Goudarzi G, Vosoughi M, Mohammadi MJ, Salmanzadeh S, Zallaghi E. Relationship between Particulate matter less than 10 microns exposures and health effects on humans in Ahvaz, Iran. *Arch Hyg Sci* 2015;4(2):23-32.
6. Goudarzi G, Geravandi S, Mohammadi MJ, Vosoughi M, Angali KA, Zallaghi E, et al. Total number of deaths and respiratory mortality attributed to particulate matter (PM₁₀) in Ahvaz, Iran during 2009. *Int J Environ Health Eng* 2015;4(1):33.
7. Goudarzi G, Geravandi S, Salmanzadeh S, Mohammadi MJ, Zallaghi E. The number of myocardial infarction and cardiovascular death cases associated with sulfur dioxide exposure in ahvaz, iran. *Arch Hyg Sci* 2014;3(3):112-9.
8. Mohammadi MJ, Godini H, Khak MT, Daryanoosh SM, Dobaradaran S, Goudarzi G. An Association Between Air Quality and COPD in Ahvaz, Iran. *Jundishapur J Chronic Dis Care* 2015;4(1):e26621.
9. Goudarzi G, Geravandi S, Saeidimehr S, Mohammadi M, Vosoughi Niri M, Salmanzadeh S, et al. Estimation of health effects for PM₁₀ exposure using of Air Q model in Ahvaz City during 2009. *Iran J Health Environ* 2015;8(1):117-26.
10. Geravandi SZ, Goudarzi Gh, Yari AR, Soltani F, Shireigi E, Mohammadi MJ, Kalantar F, Mohamadrezai Esfarjani N, Alavi SSh, Salmanzadeh S. Effects of PM₁₀ on human health in the western half of Iran (Ahvaz, Bushehr and Kermanshah Cities). *Arch Hyg Sci* 2015;4(4):179-86.
11. Goudarzi G, Zallaghi E, Neissi A, Ankali KA, Saki A, Babaei AA, et al. Cardiopulmonary mortalities and chronic obstructive pulmonary disease attributed to ozone air pollution. *Arch Hyg Sci* 2013;2(2):62-72.