

ISSN-0976-0245 (Print) • ISSN-0976-5506 (Electronic)

Volume 11 / Number 03 / March 2020



# Indian Journal of Public Health Research & Development

An International Journal

Website:

[www.ijphrd.com](http://www.ijphrd.com)

# Indian Journal of Public Health Research & Development

## EXECUTIVE EDITOR

**Prof. Vidya Surwade**

Deptt. of Community Medicine, Dr Baba Saheb Ambedkar, Medical College & Hospital, Rohini, Delhi

## INTERNATIONAL EDITORIAL ADVISORY BOARD

1. **Dr. Abdul Rashid Khan B. Md Jagar Din** (*Associate Professor*)  
Department of Public Health Medicine, Penang Medical College, Penang, Malaysia
2. **Dr. V Kumar** (*Consulting Physician*)  
Mount View Hospital, Las Vegas, USA
3. **Basheer A. Al-Sum**,  
Botany and Microbiology Deptt, College of Science, King Saud University,  
Riyadh, Saudi Arabia
4. **Dr. Ch Vijay Kumar** (*Associate Professor*)  
Public Health and Community Medicine, University of Buraimi, Oman
5. **Dr. VMC Ramaswamy** (*Senior Lecturer*)  
Department of Pathology, International Medical University, Bukit Jalil, Kuala Lumpur
6. **Kartavya J. Vyas** (*Clinical Researcher*)  
Department of Deployment Health Research,  
Naval Health Research Center, San Diego, CA (USA)
7. **Prof. PK Pokharel** (*Community Medicine*)  
BP Koirala Institute of Health Sciences, Nepal

## NATIONAL SCIENTIFIC COMMITTEE

1. **Dr. Anju D Ade** (*Professor*)  
Community Medicine Department, SVIMS, Sri Padamavati Medical College, Tirupati,  
Andhra Pradesh.
2. **Dr. E. Venkata Rao** (*Associate Professor*) Community Medicine,  
Institute of Medical Sciences & SUM Hospital, Bhubaneswar, Orissa.
3. **Dr. Amit K. Singh** (*Associate Professor*) Community Medicine,  
VCSG Govt. Medical College, Srinagar – Garhwal, Uttarakhand
4. **Dr. R G Viveki** (*Associate Professor*) Community Medicine,  
Belgaum Institute of Medical Sciences, Belgaum, Karnataka
5. **Dr. Santosh Kumar Mulage** (*Assistant Professor*)  
Anatomy, Raichur Institute of Medical Sciences Raichur(RIMS), Karnataka
6. **Dr. Gouri Ku. Padhy** (*Associate Professor*) Community and Family  
Medicine, All India Institute of Medical Sciences, Raipur
7. **Dr. Ritu Goyal** (*Associate Professor*)  
Anaesthesia, Sarswathi Institute of Medical Sciences, Panchsheel Nagar
8. **Dr. Anand Kalaskar** (*Associate Professor*)  
Microbiology, Prathima Institute of Medical Sciences, AP
9. **Dr. Md. Amirul Hassan** (*Associate Professor*)  
Community Medicine, Government Medical College, Ambedkar Nagar, UP
10. **Dr. N. Girish** (*Associate Professor*) Microbiology, VIMS&RC, Bangalore
11. **Dr. BR Hungund** (*Associate Professor*) Pathology, JNMC, Belgaum.
12. **Dr Sartaj Ahmad**, PhD Medical Sociology, *Associate Professor*,  
Swami Vivekananda Subharti University Meerut UP India
13. **Dr Sumeeta Soni** (*Associate Professor*)  
Microbiology Department, B.J. Medical College, Ahmedabad, Gujarat, India

## NATIONAL EDITORIAL ADVISORY BOARD

1. **Prof. Sushanta Kumar Mishra** (*Community Medicine*)  
GSL Medical College – Rajahmundry, Karnataka
2. **Prof. D.K. Srivastava** (*Medical Biochemistry*)  
Jamia Hamdard Medical College, New Delhi
3. **Prof. M Sriharibabu** (*General Medicine*) GSL Medical College, Rajahmundry,  
Andhra Pradesh
4. **Prof. Pankaj Datta** (*Principal & Prosthodontist*)  
Indraprastha Dental College, Ghaziabad

## NATIONAL EDITORIAL ADVISORY BOARD

5. **Prof. Samarendra Mahapatro** (*Pediatrician*)  
Hi-Tech Medical College, Bhubaneswar, Orissa
6. **Dr. Abhiruchi Galhotra** (*Additional Professor*) Community and Family  
Medicine, All India Institute of Medical Sciences, Raipur
7. **Prof. Deepti Pruthvi** (*Pathologist*) SS Institute of Medical Sciences &  
Research Center, Davangere, Karnataka
8. **Prof. G S Meena** (*Director Professor*)  
Maulana Azad Medical College, New Delhi
9. **Prof. Pradeep Khanna** (*Community Medicine*)  
Post Graduate Institute of Medical Sciences, Rohtak, Haryana
10. **Dr. Sunil Mehra** (*Paediatrician & Executive Director*)  
MAMTA Health Institute of Mother & Child, New Delhi
11. **Dr Shailendra Handu**, *Associate Professor*, Phrma, DM (Pharma, PGI  
Chandigarh)
12. **Dr. A.C. Dhariwal**: *Directorate* of National Vector Borne Disease  
Control Programme, Dte. DGHS, Ministry of Health Services, Govt. of  
India, Delhi

**Print-ISSN:** 0976-0245-**Electronic-ISSN:** 0976-5506, **Frequency:** Quarterly  
(Four issues per volume)

**Indian Journal of Public Health Research & Development** is a double blind peer reviewed international journal. It deals with all aspects of Public Health including Community Medicine, Public Health, Epidemiology, Occupational Health, Environmental Hazards, Clinical Research, and Public Health Laws and covers all medical specialties concerned with research and development for the masses. The journal strongly encourages reports of research carried out within Indian continent and South East Asia.

The journal has been assigned International Standards Serial Number (ISSN) and is indexed with Index Copernicus (Poland). It is also brought to notice that the journal is being covered by many international databases. The journal is covered by EBSCO (USA), Embase, EMCare & Scopus database. The journal is now part of DST, CSIR, and UGC consortia.

**Website : [www.ijphrd.com](http://www.ijphrd.com)**

©All right reserved. The views and opinions expressed are of the authors and not of the Indian Journal of Public Health Research & Development. The journal does not guarantee directly or indirectly the quality or efficacy of any product or service featured in the advertisement in the journal, which are purely commercial.

## Editor

**Dr. R.K. Sharma**  
Institute of Medico-legal Publications  
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,  
Sector- 32, Noida - 201 301 (Uttar Pradesh)

## Printed, published and owned by

**Dr. R.K. Sharma**  
Institute of Medico-legal Publications  
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,  
Sector- 32, Noida - 201 301 (Uttar Pradesh)

## Published at

**Institute of Medico-legal Publications**  
Logix Office Tower, Unit No. 1704, Logix City Centre Mall,  
Sector- 32, Noida - 201 301 (Uttar Pradesh)



# Indian Journal of Public Health Research & Development

www.ijphrd.com

## Contents

Volume 11, March 03

March 2020

1. Development and Validation of a Questionnaire on Eating Behaviour for School Children and its Correlation with Nutritional Status.....1  
*A. Ayesha Fathima, T.H. Hema, A.J. Hemamalini*
2. Occupational Varicella outbreak at a Tertiary Care Hospital: An Insight.....7  
*Abhisek Mishra, C.M. Singh, Binod Ku Pati, Barkha Rani Beck, Hari Krishnan Ashokan*
3. An Exploratory Study To Identify Factors Affecting Non Compliance To Dots Therapy Among Tb Patients At Selected Dots Centre Vadodara ..... 13  
*Akash S. Patel, Miss. Varsha Hun, Mr. Adithya S.*
4. Assessment of Cognitive Impairment among Elderly in the Selected Rural Community, Kancheepuram District, Tamil Nadu ..... 19  
*Akila K., Divya R., Preethianushya M., Aravindhan B., Rogina J.S. Savarimuthu*
5. Safety and Tolerability of Two Different Formulations of Mycophenolate (Mycophenolate Mofetil and Mycophenolate Sodium) among Patient with Connective Tissue Disease Associated Interstitial Lung Disease (CTD-ILD) in a Tertiary Care Hospital.....22  
*Amrut Kumar Mohapatra, Pratima Singh*
6. Assessment of Awareness of Parents on Importance of Dental Care in Pediatric Patients in Ethnic Tamil Population .....27  
*Anandhi D., R. Bharanidharan, Lekshmy Jayan, Ramya R., K. Rajkumar, R. Hemalatha*
7. Study of Total Time Taken for OPD Billing Process in a Multi-Specialty Hospital .....32  
*Anil Pandit, Savita Prashar*
8. Sleep Quality and Glycemic Control among Patients with Type II Diabetes Mellitus .....41  
*Anju Babu, Sabitha V Janardhanan, Sreevidhya R., Sruthy K.S.*
9. A Comprehensive Break Even Analysis of MRI and CT Unit of a Tertiary Care Hospital in Sikkim.....47  
*Ankit Singh, Priya Ravi, Soniya Joseph*
10. A Descriptive Survey on the Consumption of Sweetened Beverages and Contributing Factors among Adolescents in Selected PU Colleges at Mangaluru .....53  
*Anu Joseph, Anuja Susan Varughese, Archana P.S., Ashigha Anil Kumar E., Aswathi P., Athira Anto, Anju Ullas*

**XXX**

395. Alpha-Fetoprotein for Prediction of Placenta Accreta in Women with Complete Placenta Previa Centralis: A Prospective Study .....2148  
*Mohammed Hany Mosbeh, Mohammed Abdallah Mohammed, Mo'men Mohamed Hassan, Ahmed Rabie Abd El-Raheim, Heba Reda Mohammed*
396. Health Promoting School in Surabaya, Indonesia: The Six Elements Implementation .....2154  
*Muji Sulistyowati, Kuntoro, Oedojo Soedirham, Budi Prasetyo*
397. Evaluation Context and Input of National Health Insurance in Ternate City.....2159  
*Muliana Muliana, Fauzi Almari*
398. The Effectiveness Comparison of Type of Treatments in Decreasing of Total Dissolved Solid (TDS) and Total Suspended Solid (TSS) in Household Wastewater .....2164  
*Muliyadi Muliyadi*
399. Environmental Health Risk Analysis of Carbon Monoxide Exposure among High Activity Communities Along “X” Street, Yogyakarta .....2170  
*Musfirah, Ahmad Faizal Rangkuti, Lyva Merintan Bahagiana*
400. The Effect of Work Satisfaction on the Quality of Health Services (Literature Review).....2176  
*Mutmainah Indriyati, Syahrizal Syarif*
401. Respiratory Symptoms of Housewives Exposed to SO<sub>2</sub> From Steel Industry in West Cikarang, Indonesia2181  
*Nada Amirah, Agustin Kusumayati, Suyud*
402. Efficacy of Endoscopic Transantral Versus Transorbital Surgical Approaches in the Repair of Orbital Blow-Out Fractures (Randomized Clinical Trial) .....2187  
*Nahla M. Awad, Reem H. Hossameldin, Samer N. AbdelGabar, Ibrahim E. Shindy*
403. Relationships of Workloads, Working Conditions and Dual Role Conflict with Nursing Stress .....2193  
*Nasrah Nasrah, Sulistiyani Sulistiyani, Elen V. Purba*
404. Intention of Diabetic Foot Ulcer Prevention Model Based on Social Support and Personal Agency Perspectives .....2198  
*NasrunPakaya, Kusnanto, Hari Basuki Notobroto, Rika Subarniati Triyoga*
405. The Development of Diabetic Foot Ulcer Prevention Model Based on Psychosocial Perspectives, Attitude, Intention, Coping Mechanisms.....2204  
*NasrunPakaya, Kusnanto, Hari Basuki Notobroto, Rika Subarniati Triyoga*
406. Association of Syphilis and HIV among Indirect Female Sex Worker in Indonesia: Secondary Data Analysis of Integrated Behaviour Biological Survey in 2015 .....2211  
*Neneng Aini, Mondastri Korib Sudaryo, Syahrizal Syarief*
407. The Knowledge of the Use of the Contraceptive Method among Married Men with Fertility Age 15-54 Years (Analysis of IDHS 2017 Data) .....2216  
*Nofia Caecilia Lae, Sudijanto Kamso*
408. Preliminary Study: Reliability and Validity of CFM-1 Form as Physical Literacy Assessment Instrument.....2220  
*Nur Ikhwan Mohamad, Muhammad Hannan Sazali, Ali Md Nadzalan, Asmadi Ishak, Hishamuddin*

# Environmental Health Risk Analysis of Carbon Monoxide Exposure among High Activity Communities Along “X” Street, Yogyakarta

Musfirah<sup>1</sup>, Ahmad Faizal Rangkuti<sup>1</sup>, Lyva Merintan Bahagiana<sup>1</sup>

<sup>1</sup>Faculty of Public Health, Universitas Ahmad Dahlan Yogyakarta, <sup>1</sup>Prof.Dr. Soepomo Street, Janturan, Yogyakarta

## Abstract

**Background:** The most exhaust-gas produced by motor vehicles consists of 71% carbon monoxide and it becomes an impact on air pollution and human health risk. This study aims to analyze the environmental health risk health of carbon monoxide exposure to high activity communities at X Street, Yogyakarta.

**Method:** This study was an observational study with Environmental Health Risk Analysis (EHRA) approach. This study was conducted in 2019 with 269 respondents. The respondents were chosen by using a purposive sampling method with the criteria; they had been work five years and a minimum age of nineteen years old. Besides, carbon monoxide measurement was conducted in three zones.

**Findings:** The average carbon monoxide concentration was 7,5035 mg/m<sup>3</sup>, Weight (Wb) median was 60 kg, Exposure time (tE) was 11 hours/day, Exposure duration (Dt) was 10 years, and Inhalation rate (R) was 0,83 m<sup>3</sup>/hour. Besides, the intake real-time value of non-carcinogen was 0,395 mg/kg/day with 0,329 of Risk Quotient (RQ) level. There were sixteen respondents with (RQ>1) value that might have the risk. Hence, risk management was needed by decreasing the concentration value and the inhalation rate.

**Conclusion:** The main risk of carbon monoxide exposure was a respiratory disorder in real-time and lifetime duration. The Technical Implementation Unit of Environmental Agency needed ISPU measurement by routinely to monitor the carbon monoxide at X Street and recommended to use the Personal Protective Equipment (PPE) or mask.

**Keywords:** Air pollution, Carbon Monoxide, EHRA, Risk management.

## Introduction

Air pollution can cause poor health effect. According to the Air Quality Index (IQAIR)<sup>1</sup> that Indonesia has first ranks in Southeast Asia and 11th ranks as the most polluted country in the world. The main source of air pollution are transportation, motor vehicles, almost 60% of the pollutants produced consist of carbon monoxide (CO)<sup>2</sup>. World Health Organization (WHO)<sup>3</sup> reported that air pollution causes the death of approximately 7 million people worldwide that 29% had lung cancer, 24% had a stroke, 25% had coronary heart disease, and 43% had lung disease.

Incomplete combustion of vehicles will produce CO gas. The inhalation path of CO gas into the human body through the respiratory and circulates throughout

the body sucked into the lungs and binds to blood hemoglobin in the form of COHb. This mechanism will lack of oxygen and it can cause symptoms of poisoning to the body<sup>4</sup>. Long-term exposure to CO can cause headaches, dizziness, nausea, vomiting, blood vessel dilation, blurred vision, chest pain, weakness, confusion, pulmonary edema, pulmonary arrest, cardiac arrest, seizures, and coma<sup>5</sup>.

Special Region of Yogyakarta especially X street that various vehicles crowded the road not only during rush hours but also even jammed because it is one of the tourist destinations, business or economic center<sup>6</sup>. Based on Environmental Agency<sup>7</sup> data that the quality of CO ambient air carried out in front of the Bringharjo market was 1,789.44 µg/Nm<sup>3</sup>. Central Statistics

Agency<sup>8</sup> reported that the number of motorized vehicles of Yogyakarta city reached 4,616,016 vehicles. The high volume of vehicles with the small and narrow area of highway causes a high amount of vehicle density, it is inversely proportional to the speed of vehicles passing through the road and increase the concentration of pollutants. The lower speed of vehicles will result in higher concentrations of pollutants that present on road<sup>9</sup>. The high concentration of CO can endanger human health<sup>10</sup>. The communities at high risk of CO poisoning to people who have high activity along the X street likely traders and Trans Jogja bus stops officers who work more than 8 hours per day.

The research objective is examining the magnitude of the environmental health risk of CO exposure as early detection of health risk in high-activity communities along X Street, Yogyakarta City.

### Material and Method

This study was using the Environmental Health Risk Analysis (EHRA) method to determine the magnitude

of health risks due to CO exposure to the high activity communities along X Street in Yogyakarta. This study was conducted in 2019. The subjects were high-activity communities along X Street and using purposive sampling technique.

Subjects were traders and Trans Jogja bus stop officers who taken based on the length of time at the research location more than 5 years of work period and over 19 years old. The total sample amount of 269 people. The object used as the ambient air of CO along X Street that taken in 3 zones. The variables including: CO concentration (C), inhalation rate (R), respondent's body weight (Wb), exposure time (tE), frequency of exposure (fE), duration of exposure (Dt), intake (I), health risk (RQ) value, and risk management.

### Results

The EHRA variable have median value i.e. body weight of 60 kg, exposure time of 11 hours/day, exposure frequency of 353 day/year, duration of exposure of 10 year. It is result complete shown in table 1.

**Table 1: The Distribution Frequency of EHRA Variables on Respondents**

Variable	High activity communities				Total	
	Traders		Bus Stop Officers			
	N	%	N	%	n	%
<b>Weight (Kg)</b>						
>60	117	43	5	2	122	45
≤60	143	54	4	1	147	55
Total	260	97	9	3	269	100
<b>Exposure Time (hours/day)</b>						
>11	129	48	0	0	129	48
≤11	131	49	9	3	140	52
Total	260	97	9	3	269	100
<b>Exposure Frequency (day/year)</b>						
>353	116	43	8	3	124	46
≤353	144	54	1	0	145	54
Total	260	97	9	3	269	100
<b>Duration of Exposure (year)</b>						
>10	115	43	5	2	120	45
≤10	145	54	4	1	149	55
<b>Total</b>	<b>260</b>	<b>97</b>	<b>9</b>	<b>3</b>	<b>269</b>	<b>100</b>

Source: Primary Data, 2019

The determination of intake rate in this study based on the default value (NAAQS) EPA<sup>11</sup> that is equal to 0,83 m<sup>3</sup>/hour and the RfC value used for CO risk agents is 1,24 mg/kg/day. The results of measurements of CO in ambient air along X Street conducted in one measurement in zone I:6.15 mg/m<sup>3</sup>,zone II:8,255 mg/m<sup>3</sup>,and zone III:8,334 mg/m<sup>3</sup>.With a mean value of 7,5035 mg/m<sup>3</sup>,a median of 8,255 mg/m<sup>3</sup>,a minimum of 6,15 mg/m<sup>3</sup>,a maximum of 8,343 mg/m<sup>3</sup>.

The table 1 showed that the majority respondents on traders have body weight ≤60 kg amount of 54%, exposure time ≤ 11 hours/day amount of 49%, exposure frequency ≤ 353 days/year amount of 54%, and duration of exposure ≤ 10 years amount of 54%. Based on the value of each variable in Table 1 showed that the median value of intake rate 0,395 mg/kg/day.

**Table 2: The Respondents Frequency Based on Intake Rate Value In Realtime and Lifetime Exposures**

Intake Rate (mg/kg/day)	High activity Communities								Total			
	Traders				Bus Stop Officers							
	Realtime		Lifetime		Realtime		Lifetime		Realtime		Lifetime	
	n	%	n	%	n	%	n	%	N	%	N	%
>0,395	131	49	259	96	3	1	9	3	134	50	268	99
≤0,395	129	48	1	1	6	2	0	0	135	50	1	1
Total	260	97	260	97	9	3	9	3	269	100	269	100

**Table 3: The Respondent Frequency Based on RQ Value in Realtime and Lifetime Exposures**

RQ Value	High activity Communities								Total			
	Traders				Bus Stop Officers							
	Realtime		Lifetime		Realtime		Lifetime		Realtime		Lifetime	
	n	%	n	%	n	%	n	%	N	%	N	%
>1	16	6	82	30	0	0	1	1	16	6	83	31
≤1	244	91	178	66	9	3	8	3	253	94	186	69
Total	260	97	260	96	9	3	9	4	269	100	269	100

Source: Primary Data, 2019

Based on table 3, it is known that respondents who work as traders in the realtime estimation with RQ value of >1 as much as 6% and the estimated lifetime duration with RQ value >1 amount of 30%, it means the traders is not safe for their health. The following table below is the calculation table for risk management.

**Table 4: Risk Management of CO Safe Concentration in Respondents**

Zone	Wb (Kg)	R (m <sup>3</sup> /hour)	fE (day/year)	Concentration in Exposure Duration (Year)					
				5	10	15	20	25	30
I	60,23	0,83	332,531	592,609259	296,304629	197,536420	148,152315	118,521852	98,768210
II	61,72	0,83	362,073	557,721626	278,860813	185,907209	139,430406	111,544325	92,953604
III	61	0,83	352,681	565,894508	282,947254	188,631503	141,473630	113,137902	94,315751

Source: Primary Data, 2019.

Table 4 showed that the concentration of safe inhalation of air containing CO gas with average body weight, intake rate and frequency of exposure of respondents will decrease until the duration of exposure of 30 years.

**Table 5: Risk Management of CO Gas Inhalation Rate in Respondents**

Zone	Wb (Kg)	C (mg/m <sup>3</sup> /hour)	fE(day/year)	Inhalation Rate in Exposure Duration (Year)					
				5	10	15	20	25	30
I	60,23	6,15	332,531	79,978253	39,989127	26,659418	19,994563	15,995651	13,329709
II	61,72	8,255	362,073	55,920128	27,960064	18,640043	13,980032	11,184026	9,320021
III	61	8,343	352,681	56.297811	28,148906	18,765937	14,074453	11,259562	9,382969

Source: Primary Data, 2019.

The table 5 shown that the higher concentration of CO in the air correlate with the decrease of inhalation rate which become safe for repondents to the health risk of noncarcinogenic diseases and the inhalation rate will decrease according to increases the duration of exposure.

**Discussions**

CO gas potentially as toxic from the presence of air pollution from vehicle exhaust fumes, especially those which using gasoline fuel. The air pollution will cause the decrease of air quality level and human health<sup>12</sup>. CO gas concentration compared with the CO quality standard according to Governor Decree<sup>13</sup> which amounted to 30000 µg/m<sup>3</sup> or 30,000 mg/m<sup>3</sup>, it means that CO concentration levels along X street were still below the predetermined quality standard. The different CO concentration in the ambient air obtained is due to several factors including temperature, humidity, wind speed and air pressure<sup>14</sup>.

The calculation of the intake value is influenced by the concentration of the risk agent in the air, the inhalation rate, exposure time, duration of exposure, and body weight. Based on the intake calculation it is known that the daily exposure time and annual exposure frequency is directly proportional to the intake value. It means that the annual frequency of exposure to the respondent caused by risk agent correlate with intake value that against health problems due to risk agent exposure<sup>15</sup>. Other factors that influence the amount of intake are age, working period, smoking habits and use of personal protective equipment (PPE)<sup>16</sup>.

RQ value is obtained from the comparison between the intake rate with RfC value<sup>21</sup> and it has a relationship that intake compared with the RfC value, becomes the risk characteristics value. The RfC value used in this study was 1,24 mg/kg/day. It is obtained from calculations using the intake formula with default values for each variable, which is the difference in the

concentration value. The concentration value is obtained from the RfC of CO in mg/m<sup>3</sup> which is the standard in NAAQS<sup>10</sup>.

CO compounds can be toxic to the human body because the reaction between CO and hemoglobin (Hb) in the blood. Hb in humans functions as a transport system to carry oxygen in the form of oxyhemoglobin from the lungs to the body’s cells and carry CO<sub>2</sub> in the form CO<sub>2</sub> Hb from the body’s cells to the lungs. Hb can form carboxyhemoglobin with the presence of CO. If the reaction occurs, the blood’s ability to transport oxygen is reduced. The affinity of CO to hemoglobin is 200 times higher than in affinity of oxygen to hemoglobin, as a result of CO and O<sub>2</sub> together in the air and is formed as COHb in the number of far more than the O<sub>2</sub>Hb<sup>11</sup>. The highest percentage of hemoglobin bound in the form of COHb is getting worse, the effect on human health<sup>17</sup>.

The first risk management is a decrease in CO concentrations so that all populations are safe from the health problems of CO exposure the concentrations must be reduced below the average concentration. To reduce the concentration of CO gas risk agents along X Street, it can reduce the capacity of the main pollutant source likely motor vehicles. Reducing the capacity of motorized vehicles can be done with the existence of a car-free day action weekly routine action along X Street, Yogyakarta City. This will affect the reduction of pollutants due to motorized vehicles. The previos study related to the reduction of CO concentration with the car-free day was conducted by other study<sup>18</sup> reported that air quality monitoring of CO generated from motor vehicle emissions has been decreased by car-free day action at the intersection of Semarang City. The subsequent reduction in ambient air concentration by planting trees or phytoremediation. Phytoremediation is a method by using forage plants to move, accumulate and change harmful contaminants into harmless substances. The yellow palm (*Chrysalidocarpus lutescens*) can be



planted, it is very effective for absorbing toxic gases into the stomata from vehicle fumes, besides plants that have broad hairy leaves and rough surfaces<sup>19</sup>.

The second risk management is reduction of inhalation by using PPE to minimize the possibility of exposure to inhaled CO gas from ambient air. This study in line with previous study<sup>20</sup> to reduce the amount of exposure to security guards and parking attendants at Campus X Yogyakarta can be done with preventive measures by using a PPE.

The high concentration of CO in the ambient air will affect a health risk to CO intake into the body. So, the higher concentration of CO positive correlates with a higher intake value and it can be prevented by using PPE such as masks. Previous studies reported that the average COHb levels of respondents who use masks are lower than respondents who do not use masks<sup>21</sup>.

The socialization was held by Technical Management Unit (UPT) in collaboration with the Department of Yogyakarta Tourism, the Environment Agency, and Academic Higher Education to educate the use of PPE and provide information related to health risks due to CO gas emissions. The socialization is expected to reduce the magnitude of risks arising from motor vehicle emissions, especially in CO gas, for high-activity communities along X Street, Yogyakarta City.

### Conclusion

CO exposure to high activity communities will impact their health because respondents have  $RQ > 1$ . Risk management through the reduction of concentration and decrease of the inhalation rate in high activity communities along X Street, Yogyakarta City.

**Conflict of Interest:** The authors declare that there are no conflict of interest regarding the publication.

**Source of Funding:** Thanks to the Research and Community Service of Universitas Ahmad Dahlan, Indonesia for the assistance to the lecturer by Fundamental Research Grants 2019 Number :PF-095/SP3/LPPM-UAD/IV/2019. So, the research can be completed properly.

**Ethical Clearance:** The research has been approved ethical clearance from Ethical Review Committees of Universitas Ahmad Dahlan Number 01905055.

### References

1. IQAir. 2018 World Air Quality Report. Accessed 2019, 18th July available on <https://www.airvisual.com/world-most-polluted-cities?>.2018.
2. Fardiaz, S. Water and Air Pollution. Yogyakarta: Canisius, 2015; Pp.91-103. WHO (World Health Organization). A Leading Cause Of Non-Communicable Disease Death. 2018. Accessed on August, 3rd 2019, available on <https://who.int>.
3. Aprilia, D.N. Environmental Health Risk Analysis of Carbon Monoxide (CO) Gas Exposure to Toll collectors in Semarang. Public Health Journal. 2017; 5 (3):2356-3346.
4. Ogunseye, O.O., Ana, G.R.E., Chiara, D.C., and Shendell, D.G., Carboxyhaemoglobin Levels among Traders Exposed to Vehicular Emissions in Three Motor Parks in Ibadan Nigeria. Journal of Environmental and Public Health. 2018; Vol. 2018, pp. 1-8.
5. Pamungkas, R.E., Environmental Health Risk Analysis (EHRA) Due to Exposure to Carbon Monoxide (CO) Through Inhalation at Traders Along the Front Street of Projo Ambarawa Market, Semarang District. Public Health Journal. 2017; 5 (5):2356-3346.
6. Environmental Agency. Ambient Air Quality Data. Yogyakarta Environment Agency. 2015.
7. Central Statistics Agency. Land Transportation Statistics Data. Yogyakarta Central Statistics Agency. 2017.
8. Purita, E.D., Management of public transportation on Malioboro Street in Yogyakarta. Report. Yogyakarta State University Yogyakarta. 2013.
9. Srinivas, R., Big, G., Pshin, S., Role Transportation in Elevated CO Levels Over Delhi during the Onset Phase of Monsoon. Atmospheric Environment. 2016; Vol. 140, pp. 234-241.
10. NAAQS. Criteria Air Pollutants: NAAQS Table. Retrieved March, 2019, from <https://www.epa.gov/criteria-air-pollutants/naaqs-table>. 2016.
11. Sumantri, A., Environmental Health. Jakarta: Kencana Prenada Media Group. 2013.
12. Decree of the Governor. DIY No. 153 of 2003 concerning Regional Ambient Air Quality Standards in the Special Province of Yogyakarta
13. Zheng, B., Chevallier, F., Ciais, P., Yin, Y., Deeter, M., Zhang, Q., He, K., Rapid Decline In Carbon

- Monoxide Emissions And Export From East Asian Between Years 2005 And 2016. *Environmental Research Letters*. 2018; 13(8) : 1245-1356.
14. Hazsya, M., Relationship of Carbon Monoxide (CO) Concentration and Risk Factors with Co-Hb Concentration in Blood at Risk Communities Along Setiabudi Road Semarang. *Public Health Journal*. 2018; 6 (6):2536- 3346.
  15. Iriyana, I. The Effect of Air Pollution Exposure and Smoking Habits on Lung Function in Bus Drivers in Tirtonadi Terminal Surakarta. Report. Muhamadiyah University Surakarta. 2014.
  16. Dermitaz, I., Aksit, H., and Zehra. 2016. Assessment of Exposure to Tobacco Smoke: Measurement of exhaled Carbon Monoxide and Hair Nicotine. *Turkish Journal of Medical Sciences*. 2016; 4(4) :739-745.
  17. Putra, Raditya, N., Analysis of the Impact of Car Free Day Activities on Air Quality Carbon Monoxide (CO) in the Area Around Simpang Lima Using the Caline 4 Program and Surfer Case Study in Semarang City. *Journal of Environmental Engineering*. 2017;6(1): 1-11.
  18. Kurubaran, A., Krisna, V., Vignesh, K., and Bhaskaran, A., Air Pollution Monitoring System using Android Application. *International Journal of Current Research and Review*. 2018; 10(21) :112-115.
  19. Musfirah dan Rangkuti, A.F. 2018. Hubungan Durasi Pajanan PM 10 dengan Kapasitas Vital Paksa Paru Satpam Dan Petugas Parkir Di Kampus X Kota Yogyakarta. *Jurnal Keperawatan Dan Kesehatan Masyarakat*. 2018; 7(2):133-142.
  20. Anggraini, D.N., Rahardjo, M., Nurjazuli, Relationship between Traffic Density and Co-Hb Concentration in High-Risk Communities Along Semarang City National Road. *Journal of Public Health*. 2016; 4(2):139-148.
  21. Jihan, F., Rohim, T.A., Noeroel, M., Mulyono. Analysis of Correlation between Toluene Exposure and Health Risk Characterization on Printing Worker of Plastic Bags Industry. *Indian Journal of Public Health Research & Development*. 2019; 10(6): 411-415.

## Call for Papers / Article Submission

The editor invites scholarly articles that contribute to the development and understanding of all aspects of Public Health and all medical specialities. All manuscripts are double blind peer reviewed. If there is a requirement, medical statistician review statistical content. Invitation to submit paper: A general invitation is extended to authors to submit papers papers for publication in IJPHRD.

### **The following guidelines should be noted:**

- The article must be submitted by e-mail only. Hard copy not needed. Send article as attachment in e-mail.
- The article should be accompanied by a declaration from all authors that it is an original work and has not been sent to any other journal for publication.
- As a policy matter, journal encourages articles regarding new concepts and new information.
- Article should have a Title
- Names of authors
- Your Affiliation (designations with college address)
- Abstract
- Key words
- Introduction or back ground
- Material and Methods
- Findings
- Conclusion
- Acknowledgements
- Interest of conflict
- References in Vancouver style.
- Please quote references in text by superscripting
- Word limit 2500-3000 words, MSWORD Format, single file

All articles should be sent to: **editor.ijphrd@gmail.com**

***Send all payment to :***

**Institute of Medico-Legal Publications**

Logix Office Tower, Unit No. 1704, Logix City Centre Mall

Sector- 32, Noida - 201 301 (Uttar Pradesh)

Mob: 09971888542, 0120- 429 4015

E-mail: editor.ijphrd@gmail.com, Website: www.ijphrd.com

---

Published, Printed and Owned : Dr. R.K. Sharma

Printed : Printpack Electrostat G-2, Eros Apartment, 56, Nehru Place, New Delhi-110019

Published at: Institute of Medico Legal Publications Pvt. Ltd., Logix Office Tower, Unit No. 1704, Logix City Centre Mall Sector- 32,  
Noida - 201 301 (Uttar Pradesh) Editor : Dr. R.K. Sharma, Mobile: + 91 9971888542, Ph. No: +91 120- 429 4015