# Indian Journal of Public Health Research & Development

**EXECUTIVE EDITOR**

Prof. Vidya Surwade  
Deprt. of Community Medicine, Dr Baba Saheb Ambedkar, Medical College & Hospital, Rohini, Delhi

## INTERNATIONAL EDITORIAL ADVISORY BOARD

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Position/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Abdul Rashid Khan (Bd Jagar Din)</td>
<td>Department of Public Health Medicine, Penang Medical College, Penang, Malaysia</td>
</tr>
<tr>
<td>2</td>
<td>Dr. V Kumar (Consulting Physician)</td>
<td>Mount View Hospital, Las Vegas, USA</td>
</tr>
<tr>
<td>3</td>
<td>Basheer A. Al-Sum,</td>
<td>Botany and Microbiology Deptt, College of Science, King Saud University, Riyadh, Saudi Arabia</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Ch Vijay Kumar (Associate Professor)</td>
<td>Public Health and Community Medicine, University of Buraiami, Oman</td>
</tr>
<tr>
<td>5</td>
<td>Dr. VMC Ramaswamy (Senior Lecturer)</td>
<td>Department of Pathology, International Medical University, Bukit Jali, Kuala Lumpur</td>
</tr>
<tr>
<td>6</td>
<td>Kartavya J. Vyas (Clinical Researcher)</td>
<td>Department of Deployment Health Research, Naval Health Research Center, San Diego, CA (USA)</td>
</tr>
<tr>
<td>7</td>
<td>Prof. PK Pokharel (Community Medicine)</td>
<td>BP Koirala Institute of Health Sciences, Nepal</td>
</tr>
</tbody>
</table>

## NATIONAL SCIENTIFIC COMMITTEE

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Position/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dr. Anju D Ade (Professor)</td>
<td>Community Medicine Department, SVIMS, Sri Padamavati Medical College, Tirupati, Andhra Pradesh</td>
</tr>
<tr>
<td>2</td>
<td>Dr. E. Venkata Rao (Associate Professor)</td>
<td>Community Medicine, Institute of Medical Sciences &amp; SUM Hospital, Bhubaneswar, Orissa</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Amit K. Singh (Associate Professor)</td>
<td>Community Medicine, VCGS Govt. Medical College, Srihart – Garhwal, Uttarakhund</td>
</tr>
<tr>
<td>4</td>
<td>Dr. R G Viveki (Associate Professor)</td>
<td>Community Medicine, Belgum Institute of Medical Sciences, Belgum, Karnataka</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Santosh Kumar Mulage (Assistant Professor)</td>
<td>Anatomy, Rainch Institute of Medical Sciences Raichur(RIMS), Karnataka</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Gouri K. Padhy (Associate Professor)</td>
<td>Community and Family Medicine, All India Institute of Medical Sciences, Raipur</td>
</tr>
<tr>
<td>7</td>
<td>Dr. Ritu Goyal (Associate Professor)</td>
<td>Anaesthesia, Sarwath Institute of Medical Sciences, Panchsheel Nagar</td>
</tr>
<tr>
<td>8</td>
<td>Dr. Anand Kalaskar (Associate Professor)</td>
<td>Microbiology, Pratihama Institute of Medical Sciences, AP</td>
</tr>
<tr>
<td>9</td>
<td>Dr. Md. Amirul Hassan (Associate Professor)</td>
<td>Community Medicine, Government Medical College, Ambedkar Nagar, UP</td>
</tr>
<tr>
<td>10</td>
<td>Dr. N. Girish (Associate Professor)</td>
<td>Microbiology, VIMS&amp;RC, Bangalore</td>
</tr>
<tr>
<td>11</td>
<td>Dr. BR Hungund (Associate Professor)</td>
<td>Pathology, JNMC, Belguaum</td>
</tr>
<tr>
<td>12</td>
<td>Dr Sartaj Ahmad, PhD Medical Sociology, Associate Professor</td>
<td>Swami Vivekananda Subharti University Meerut UP India</td>
</tr>
<tr>
<td>13</td>
<td>Dr Sumeeta Soni (Associate Professor)</td>
<td>Microbiology Department, B.J. Medical College, Ahmedabad, Gujarat, India</td>
</tr>
</tbody>
</table>

## NATIONAL EDITORIAL ADVISORY BOARD

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Position/Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Prof. Samarendra Mahapatro (Pediatrician)</td>
<td>Hi-Tech Medical College, Bhubaneswar, Orissa</td>
</tr>
<tr>
<td>6</td>
<td>Dr. Abhiruchi Galhotra (Additional Professor)</td>
<td>Community and Family Medicine, All India Institute of Medical Sciences, Raipur</td>
</tr>
<tr>
<td>7</td>
<td>Prof. Deepthi Pruthvi (Pathologist)</td>
<td>SS Institute of Medical Sciences &amp; Research Center, Davangere, Karnataka</td>
</tr>
<tr>
<td>8</td>
<td>Prof. G S Meena (Director Professor)</td>
<td>Maulana Azad Medical College, New Delhi</td>
</tr>
<tr>
<td>9</td>
<td>Prof. Pradeep Khanna (Community Medicine)</td>
<td>Post Graduate Institute of Medical Sciences, Rohtak, Haryana</td>
</tr>
<tr>
<td>10</td>
<td>Dr. Sunil Mehra (Paediatrician &amp; Executive Director)</td>
<td>MAMTA Health Institute of Mother &amp; Child, New Delhi</td>
</tr>
<tr>
<td>11</td>
<td>Dr Shailendra Handu, Associate Professor, Phrma, DM (Pharma, PG Chandigarh)</td>
<td>Bombay Institute of Health Sciences,缕缕</td>
</tr>
<tr>
<td>12</td>
<td>Dr. A.C. Dharwai: Directorate of National Vector Borne Disease Control Programme, Dte. DHSG, Ministry of Health Services, Govt. of India, Delhi</td>
<td></td>
</tr>
</tbody>
</table>

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  
©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)
# 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
395. Alpha-Fetoprotein for Prediction of Placenta Accreta in Women with Complete Placenta Previa Centeralis: A Prospective Study
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
Muji Sulistyowati, Kuntoro, Oedojo Soedirham, Budi Prasetyo

397. Evaluation Context and Input of National Health Insurance in Ternate City
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
Muliyadi Muliyadi

399. Environmental Health Risk Analysis of Carbon Monoxide Exposure among High Activity Communities Along “X” Street, Yogyakarta
Musfirah, Ahmad Faizal Rangkuti, Lyva Merintan Bahagiana

400. The Effect of Work Satisfaction on the Quality of Health Services (Literature Review)
Mutmainah Indriyati, Syahrizal Syarif

401. Respiratory Symptoms of Housewives Exposed to SO2 From Steel Industry in West Cikarang, Indonesia
Nada Amirah, Agustin Kusumayati, Suyud

402. Efficacy of Endoscopic Transtral Versus Transorbitai Surgical Approaches in the Repair of Orbital Blow-Out Fractures (Randomized Clinical Trial)
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
Nasrah Nasrah, Sulistiyani Sulistiyani, Elen V. Purba

404. Intention of Diabetic Foot Ulcer Prevention Model Based on Social Support and Personal Agency Perspectives
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
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
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)
Nofia Caecilia Lae, Sudijanto Kamso

408. Preliminary Study: Reliability and Validity of CFM-1 Form as Physical Literacy Assessment Instrument
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

Musfirah1, Ahmad Faizal Rangkuti1, Lyva Merintan Bahagiana1

1Faculty of Public Health, Universitas Ahmad Dahlan Yogyakarta, 1Prof. 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/m³, 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 m³/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)1 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)2. World Health Organization (WHO)3 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 body4. 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 coma5.

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 center6. Based on Environmental Agency7 data that the quality of CO ambient air carried out in front of the Brimahargo market was 1,789.44 µg/Nm³. Central Statistics...
Agency\(^8\) 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\(^9\). The high concentration of CO can endanger human health\(^10\). 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

<table>
<thead>
<tr>
<th>Variable</th>
<th>High activity communities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traders</td>
<td>Bus Stop Officers</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Weight (Kg)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;60</td>
<td>117</td>
<td>43</td>
</tr>
<tr>
<td>≤60</td>
<td>143</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>97</td>
</tr>
<tr>
<td>Exposure Time (hours/day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;11</td>
<td>129</td>
<td>48</td>
</tr>
<tr>
<td>≤11</td>
<td>131</td>
<td>49</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>97</td>
</tr>
<tr>
<td>Exposure Frequency (day/year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;353</td>
<td>116</td>
<td>43</td>
</tr>
<tr>
<td>≤353</td>
<td>144</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>97</td>
</tr>
<tr>
<td>Duration of Exposure (year)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;10</td>
<td>115</td>
<td>43</td>
</tr>
<tr>
<td>≤10</td>
<td>145</td>
<td>54</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>97</td>
</tr>
</tbody>
</table>

Source: Primary Data, 2019
The determination of intake rate in this study based on the default value (NAAQS) EPA$^{11}$ that is equal to 0.83 m$^3$/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$^3$, zone II: 8.255 mg/m$^3$, and zone III: 8.334 mg/m$^3$. With a mean value of 7.5035 mg/m$^3$, a median of 8.255 mg/m$^3$, a minimum of 6.15 mg/m$^3$, and a maximum of 8.343 mg/m$^3$.

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

<table>
<thead>
<tr>
<th>Intake Rate (mg/kg/day)</th>
<th>High activity Communities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traders</td>
<td>Bus Stop Officers</td>
</tr>
<tr>
<td></td>
<td>Realtime</td>
<td>Lifetime</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>&gt;0.395</td>
<td>131</td>
<td>49</td>
</tr>
<tr>
<td>≤0.395</td>
<td>129</td>
<td>48</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>97</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>RQ Value</th>
<th>High activity Communities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Traders</td>
<td>Bus Stop Officers</td>
</tr>
<tr>
<td></td>
<td>Realtime</td>
<td>Lifetime</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>&gt;1</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>≤1</td>
<td>244</td>
<td>91</td>
</tr>
<tr>
<td>Total</td>
<td>260</td>
<td>97</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Zone</th>
<th>Wb (Kg)</th>
<th>R (m$^3$/hour)</th>
<th>fE (day/year)</th>
<th>Concentration in Exposure Duration (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>I</td>
<td>60.23</td>
<td>0.83</td>
<td>332,531</td>
<td>592,609259</td>
</tr>
<tr>
<td>II</td>
<td>61.72</td>
<td>0.83</td>
<td>362,073</td>
<td>557,721626</td>
</tr>
<tr>
<td>III</td>
<td>61</td>
<td>0.83</td>
<td>352,681</td>
<td>565,894508</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Zone</th>
<th>Wb (Kg)</th>
<th>C (mg/m³ /hour)</th>
<th>fE (day/ year)</th>
<th>Inhalation Rate in Exposure Duration (Year)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>I</td>
<td>60,23</td>
<td>6,15</td>
<td>332,531</td>
<td>79,978253</td>
</tr>
<tr>
<td>II</td>
<td>61,72</td>
<td>8,255</td>
<td>362,073</td>
<td>55,920128</td>
</tr>
<tr>
<td>III</td>
<td>61</td>
<td>8,343</td>
<td>352,681</td>
<td>56.29781</td>
</tr>
</tbody>
</table>

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 respondents 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. CO gas concentration compared with the CO quality standard according to Governor Decree which amounted to 30000 µg/m³ or 30,000 mg/m³, 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.

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. Other factors that influence the amount of intake are age, working period, smoking habits and use of personal protective equipment (PPE).

RQ value is obtained from the comparison between the intake rate with RfC value 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/m³ which is the standard in NAAQS.

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 CO2 in the form CO2 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 O2 together in the air and is formed as COHb in the number of far more than the O2Hb. The highest percentage of hemoglobin bound in the form of COHb is getting worse, the effect on human health.

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 previous study related to the reduction of CO concentration with the car-free day was conducted by other study 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\textsuperscript{19}.

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\textsuperscript{20} 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\textsuperscript{21}.

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**

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


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 UPHRD.

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