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Pulmonary Health of Traffic Policemen in Low Air-Polluted Bogor Area

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Abstract

Background: *Traffic policemen are very susceptible to respiratory problems due to the potential for exposure to air pollution. Therefore, this study aimed to assess respiratory health aspects of traffic policemen in Bogor, West Java.*
Method: *Registered traffic policemen in Bogor were evaluated for respiratory symptoms, smoking habits, Fagerström Test for Nicotine Dependence (FTND) Questionnaire, chest x-ray, and spirometry. Air quality measurements were also carried out as a reference.*
Result: *During the study period, the air quality in Bogor was classified as "Good" and below the ambient air pollutant standard. A total of 95 traffic policemen participated with a mean age of 37.3±8.7 years (range 23–57 years), mean Body Mass Index (BMI) of 28.1±4.2 kg/m^2, and a length of service of 3-38 years (mean of 12.3 years). Mild pulmonary function impairment was found in 7.4% of subjects. About 61% of subjects had a smoking habit but with a low addiction index (FTND) and exCO. Decreased lung function was correlated to BMI and age (P<0.05).*
Conclusion: *Pulmonary function impairment in traffic policemen in Bogor City was correlated to age and BMI.* ***(J Respirol Indones 2021; 41(3): 161–9)***
Keywords: *lung function, traffic policemen, low air polluted area.*

Kesehatan Paru pada Polisi Lalu Lintas di Area Bogor yang Tercemar Udara Rendah

Abstrak

Latar Belakang: *Polisi lalu lintas merupakan profesi yang sangat rentan mengalami gangguan respirasi karena potensi pajanan polusi udara. Penelitian ini menilai aspek kesehatan respirasi polisi lalu lintas yang bertugas di Bogor.*
Metode*: Polisi lalu lintas yang terdaftar di Bogor dievaluasi terkait gejala respirasi, kebiasaan merokok, adiksi nikotin, foto toraks serta spirometri. Dilakukan juga pengukuran kualitas udara di daerah Gadog sebagai referensi.*
Hasil*: Kualitas udara di Bogor masih relatif baik saat penelitian dilakukan. Terdapat total 95 polisi lalu lintas berpartisipasi dengan rerata usia 37.3±8.7 tahun (rentang 23-57 tahun), rerata Indeks Masa Tubuh (IMT) 28.1±4.2 kg/m^2 dan lama bekerja sekitar 3-38 tahun (rerata 12.3 tahun). Gangguan fungsi paru ringan ditemukan pada 7.4% subjek. Sekitar 61% subjek memiliki kebiasaan merokok namun dengan indeks adiksi (FTND) dan ExCO rendah. Penurunan fungsi paru berhubungan dengan IMT dan usia (P<0.05).*
Kesimpulan: *Gangguan fungsi paru pada polisi lalu lintas di Kota bogor berkaitan dengan usia dan IMT.* ***(J Respirol Indones 2021; 41(3): 161–9)***
Kata kunci: *fungsi paru, polisi lalu lintas, area polusi udara rendah.*

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INTRODUCTION

Easy access to Jakarta Capital City had encouraged the development of nearby cities/satellite cities such as Depok, Bogor, Tangerang, and Bekasi. This development also brought an increase in transportation activities. Thus, the potential problem of air pollution shifted to satellite cities along with population growth and the rate of urbanization.[1] Bogor is one of the emerging satellite cities which is well-known for its greenery, comfort for living, location and easy access that is not far from Jakarta.[2] Data from Jasa Marga in 2011 showed that the number of motor vehicles entering Bogor through Jagorawi highway road and South Sentul until 2010 was around 772,529 vehicles per year. This high number of vehicles contributed to air pollutant emissions in Bogor.[1]

The Bogor Regional Police Station jurisdiction covers an area of 2,371.21 km^2 with a population of 3,268,671. This region consists of 40 districts with 461 villages/sub-districts. Bogor Regional Police Station is located at Tegar Beriman street. In performing the duty of protecting its jurisdiction from various security threats and maintain public order, the Bogor Police Station is divided into 26 sector police stations. The task forces that are often exposed to air pollution are the police who work on the roads every day, including the *Samapta Bhayangkara* (Sabhara) working unit and the traffic police.

The duties and authorities of Sabhara are to regulate traffic, organize and foster police security functions which include inter-regional patrols, public rally/demonstration control and community control, whereas the duties and authorities of the traffic policemen are to maintain traffic order, including guarding, regulating, escorting and patrolling, providing education to the public, conducting traffic control, performing registration and identification of motor vehicle drivers, investigating traffic accidents and enforcing laws in the field of traffics. The work system rotation of Sabhara and traffic police are divided into 2 shifts, each shift lasts about 12 hours a day on the road, with a break of 1 hour. The task rotation applied in these units is to use a rolling system tailored to the needs of personnel in each work unit, but usually they remain in the same unit for many years.

Traffic policemen is a profession with a very high risk of exposure to pollutants derived from motor vehicle emissions. Although personal protective equipment has been provided, not all police officers use them properly, such as masks, in carrying out their daily duties on the road. There were no studies on respiratory health and lung function of traffic policemen in Indonesia in low air pollution areas.

METHOD

The study was conducted at Bogor Regional Police Station and Gadog Regional Police Station from October to November 2014. Study subjects were all traffic policemen serving at Bogor Regional Police Station and met the inclusion criteria, including male aged 20–55 years, had been working as traffic policemen for more than 2 years, were able to perform lung function tests, were willing to participate in the study and signed the informed consent. The primary data such as lung function test using spirometry, exhaled carbon monoxide, chest x-ray (CXR), American Thoracic Society (ATS) respiratory questionnaire, and air quality data were used in this study. Secondary data namely Bogor Regional Police Station profile and data on the number of personnel on duty were obtained from the Bogor Regional Police Station.

The air pollution index (API) for Bogor region was obtained from the Regional Environmental Management Agency (Badan Pengelola Lingkungan Hidup Daerah/BPLHD) of Bogor City. Spirometry examination was performed following ATS standards using a calibrated MIR Spirobank® II S/N 004396 spirometer. Exhaled carbon monoxide (exCO) examination was carried out using piCO™ Smokerlyzer® according to the protocol from the manufacturer. The Fagerström Test for Nicotine Dependence (FTND) Questionnaire in Bahasa (Indonesian) was assessed to measure smoking

habits and nicotine addiction. The study has been approved by the Ethical Unit of the Faculty of Medicine Universitas Indonesia No.600/H2.F1/ETIK/2012.

RESULT

Geographically, the administrative area of Bogor District is located at coordinates 6º18' 6º47'10 South Latitude and 106º23'45-107º 13'30 East Longitude. The distance is about 60 km from the capital city of Jakarta. The regional topography is characterized by a cluster of lowlands in the north with an altitude of 50 to 70 meters, while the southern part is undulating and mountainous with an altitude of ±2,001 meters. Based on the classification of Schmidt and Ferguson, the rainfall climate in Bogor City is typed A (very wet) in the south and type B (wet) in the west. The temperature ranges from 20–30ºC while the average annual temperature is around 25ºC. Annual rainfall ranges from 2,500–5,000 mm/year, except for a small area in the north bordering Tangerang District and Jakarta City where rainfall is less than 2,500 mm.[3]

Air Pollution Index is a number that does not have a denomination unit that describes the condition of ambient air quality at a particular location and time, which is based on its impact on human health, aesthetic value and its effect on other living things. The API is determined by converting the measured air pollutants levels into a dimensionless number. Data of API were obtained from ambient air quality monitoring stations that measured pollutants including particulate matter $(PM)_{10}$, CO, nitrite dioxide (NO_2), sulfur dioxide (SO_2) and ozone (O_3). Converting air pollutants levels into API values can be done by calculations using formulas or graphs.

Standard equipment to measure levels of NO_2, SO_2, CO, O_3 and Total Suspended Particulate (TSP) was installed at the Gadog Traffic Police Station and collected 24 hours data during the study period. All equipment were provided by Regional Environmental Protection Agency (Badan Pengelola Lingkungan Hidup Daerah/BPLHD) of Bogor City. The description of API results for Bogor area is listed in Table 1. In this study, the air quality in Bogor area during the study was still quite good.

Table 1. The Air Pollution Index in Bogor during the study period

Parameter	Denomination	Test result	Quality standard
PM_{10}	µg/Nm^2	131,2	230
SO_2	µg/Nm^2	1,7	900
O_3	µg/Nm^2	133,3	200
NO_2	µg/Nm^2	15,6	400
CO	µg/Nm^2	3591	26000

About 88 subjects (92.6%) had normal results, 2 subjects (2.1%) had mild restriction, 4 subjects (4.2%) had mild obstruction whilst 1 subject (1.1%) had mixed mild obstruction and mild restriction. Chest X-ray examination pointed out that 87 subjects (91.6%) were normal and 8 subjects (8.4%) had abnormalities (Table 2).

Table 2. Clinical symptoms, CXR and lung function of traffic policemen in Bogor (n=95).

Examination	N	%
Clinical symptoms		
Cough	6	6.3
Sputum production	1	1.1
Productive cough	-	-
Dyspnea	-	-
Abnormal breathing sounds	-	-
Out of breath	-	-
Flu and chest pain	-	-
Chest X-ray		
Normal	87	91.6
Abnormal	8	8.4
Infiltrate	1	1.05
Calcification	1	1.05
Cardiomegaly	3	3.15
Left ventricle hypertrophy	1	1.05
Aorta elongation	1	1.05
Past clavicle fracture	1	1.05
Spirometry		
Normal	88	92.6
Abnormal	7	7.4
Mild restriction	2	2.1
Mild obstruction	4	4.2
Mild restriction and mild obstruction	1	1.1
Cigarette smoking		
Yes	58	61
No	37	39
Fagerström score (n=58)		
0-2 points (very low)	28	48.3
3-4 points (low)	21	36.2
5 points (moderate)	5	8.6
6-7 points (high)	4	6.9
8-10 points	-	-

Data were collected by conducting interviews, exCO levels measurement, spirometry examination, CXR examination and examination of air pollution levels in collaboration with the BPLHD of Bogor. About 180 traffic policemen on duty at the Bogor Regional Police Station were registered, however, only 98 traffic policemen fulfilled the inclusion criteria.

Most of the subjects were 41–50 years old (33.7%). The mean age was 37.3±8.7 years with a range of 23-57 years. Determination of nutritional status was based on Body Mass Index (BMI) and most subjects had overweight nutritional status (43.2%) with a mean BMI of 28.1±4.2 kg/m^2 and a range of 18.9–39.4 kg/m^2. A total of 61.1% of the subjects were active smokers, 3.2% were former smokers, and 35.8% were non-smokers (Table 2). The degree of smoking among smokers was based on the Brinkman Index (BI), which is the number of cigarettes smoked per day multiplied by the number of years of smoking. Based on the BI, in subjects who were smokers, 75.9% of them had mild BI, 22.4% had moderate BI, and 1.9% had heavy BI.

The analysis of PPE habits pointed out that 87.4% of subjects had poor habits, 9.5% had moderate habits, and only 3.2% had good habits in using face masks. The period of duty was calculated from the time the subject starts working as a traffic policeman. As many as 40 subjects (42.1%) had 6–10 years of service, 40 subjects (42.1%) had >10 years of service and 15 subjects (15.8%) had <6 years of service. The mean was 12.3 years of service (range of 3–38 years).

In this study, respiratory symptoms were obtained from questionnaires through interviews and lung function results were obtained using spirometry. The results of the lung function test are shown in Table 3.

Table 3. Mean and median of lung function test values

Lung function values	Mean±SD	Range		Median
		Min.	Max.	
FVC (liter)	3.7±0.5	2.0	4.8	3.7
FEV_1 (liter)	3.1±0.5	1.4	4.2	3.1
PEF (ml/s)	8.2±1.5	3.1	11.5	8.1
% FVC	97.7±14.8	9.0	129.0	98.0
% FEV_1/FVC	85.2±6.2	66.9	98.4	85.2

Note: FVC=forced vital capacity; FEV_1=forced expiratory volume in 1 second; PEF=peak expiratory flow

Table 4 describes the spirometry results and their factors. The subject's age and nutritional status had a significant correlation with impaired lung function.

Table 4. Correlation between demographics characteristics and impaired lung function

Characteristics	Spirometry disorders		*P*	OR	95% CI	
	Positive (+)	Negative (-)			Low	High
Age *)						
51–60 years	3	2	**0.024**	14.50	1.17	224.4
41–50 years	0	32	0.113	----	----	----
31–40 years	1	26	0.615	0.36	0.01	4.32
21–30 years	3	28				
BMI *)						
Obesity	1	29	0.078	0.13	0.01	1.33
Overweight	1	40	**0.023**	0.10	0.00	0.95
Normal/ Underweight	5	19				
Smoking habit *)						
Smokers	5	53	1.000	1.51	0.24	12.02
Former smokers	0	3	1.000	----	----	----
Non-smokers	2	32				
PPE usage *)						
Poor	6	77	1.000	----	----	----
Moderate	1	8	1.000	----	----	----
Good	0	3				
Period of duty *)						
>10 years of service	3	37	1.000	1.14	0.009	30.88
6–10 years of service	3	37	1.000	1.14	0.009	30.88
<6 years of service	1	14	----	----	----	----

Note: *) Fisher's exact test; BMI: body mass index; PPE: personal protective equipment usage

There were 58 subjects (61.1%) who had smoking habits. In this group, the level of nicotine dependence was evaluated using a Fagerström questionnaire that had been validated in Bahasa (Indonesian). One of the measurements to assess active smokers and air pollution is the assessment of exhaled CO. The exCO examination found that the mean exCO level of the subjects was 14.3 µg/Nm^2 with a standard deviation of 8.9 µg/Nm^2 and an interval of 3-43 µg/Nm^2. The correlations between smoking history (BI) and exCO levels can be seen in Table 5 and Table 6.

Table 5. Fagerström questionnaire nicotine dependence test (n=58) and exCO measurement.

Fagerström score	n	%	Addiction level
0-2 points	28	48.3	Very low
3-4 points	21	36.2	Low
5 points	5	8.6	Moderate
6-7 points	4	6.9	High
8-10 points	-	-	Very high

Table 6. exCO measurement.

Exhaled CO (µg/Nm^2)	n	Mean±SD
Non-smoker	34	7.9±3.5
Former smoker	3	7.0±3.2
Smokers		
Mild smoker	44	17.5±8.8
Moderate smoker	13	21.3±6.9
Heavy smoker	1	29.0

DISCUSSION

This study was conducted at Bogor Regional Police Traffic Unit using a cross-sectional study design. This design is widely used to examine occupational diseases as it can examine many variables at once, is relatively easy to implement and also feasible.[4] The results are still relevant today and can reflect lung function in conditions of minimal air pollution among traffic policemen. The mean age of the subjects was 40.9 years and mostly aged 41 to 50 years (33.7%). Most of the subjects were 40 years old or less (61%). Almost all subjects had good nutritional status with normal BMI or more. In general, the subjects in this study were considered to have good immunity. Nutritional levels play a very important role in health and working conditions.[5] Similar data were reported by Pravati et al, who conducted a study of the traffic police in New Delhi. On average, the traffic policemen had good nutritional status with BMI ranging from 24-25 kg/m^2 for both smokers and nonsmokers.[6]

Smoking habits were found in 61.1% of the subjects. This percentage was higher than the report from the Ministry of Health, Republic of Indonesia report in Basic Health Research (Riset Kesehatan Dasar/Riskesdas) in 2010 which was 22.8%.[7] The high smoking rate among traffic policemen requires serious attention since various studies stated that the impact of smoking on lung function was much greater than the effects caused by exposure to vehicle smoke experienced by traffic policemen daily when managing traffic. The prevalence of smoking in this study was consistent with the findings of the 2011 World Health Organization (WHO) Global Adult Tobacco Survey which found that 67% of Indonesian men smoked.[8] The reduction in lung function on smoker policemen was reported to be greater than the results of a cohort study of New York police who served during the explosion in the World Trade Center (WTC).[1]

The Fagerström questionnaire was used to measure nicotine dependence in /smokers,[9] and found that most subjects had low nicotine dependence (score <5). A score below 5 indicates that nicotine dependence is relatively low but efforts are needed to avoid progressing to higher levels. A score above 7 indicates that nicotine dependence is so high that a person cannot control him/herself to stop smoking. At this stage, a very strong effort is needed to quit smoking and medical assistance may also be needed to receive nicotine replacement therapy (NRT). The history of using PPE or masks during traffic control, or on duty, in this study was mostly poor (87.4%), while moderate and good use was only 9.5% and 3.2%, respectively. Several factors contributed to the poor use of masks. Subjects on duty felt uncomfortable when using both whistles and masks. Another reason was that the subjects felt hard to breathe and there were still lacks knowledge about the proper use of the mask.

The period of duty in this study was divided into three categories, namely 6 years of service, 6-10 years of service and ≥10 years of service. The

mean period of duty was 12.3±7.7 years with an interval of 3–38 years. Various problems such as the work environment, dust exposure and poor PPE use followed by smoking habits required special attention because they could have a cumulative impact on the emergence of occupational health problems. Zafar et al divided the study subjects into 2 groups namely a duty period of <10 years and ≥10 years. The study also compared groups based on pollution levels (mild, moderate, and severe).[10] Traffic policemen in Bangkok served in areas with high levels of air pollution showed a significant decline in FVC and FEV_1 and often complained of coughing and rhinitis compared to the control group.[11]

Spirometry is an important tool for detecting occupational lung disease. Lung function tests must be accurate, reproducible, sensitive, and can be performed at the workplace.[12] Lung function tests were performed using normal lung function values of Pneumobile Project Indonesia as a reference. These normal lung values were lower than the Caucasian or even Japanese values but were more appropriate in the Indonesian population. Most subjects had a normal lung function test with a mean FVC of 3700±500 ml. The mean %FVC was 97.7±14.8%. The mean FEV_1 was 3100±500 ml and the FEV_1/FVC ratio was 85.2% with the lowest being 66.9% and the highest 98.4%. The prevalence of lung function abnormalities was 7.4%, including 2.1% mild restriction, 4.2% mild obstruction, and 1.1% mixed mild obstruction and mild restriction. This finding was different from the Central Pollution Control Board 2008, Ministry of Environment and Forests of India which conducted an epidemiological study on the effects of air pollution on the health of adults in Delhi. The study found lung function abnormalities in 40.3% of respondents with 22.5% restriction, 10.7% obstruction, and 7.1% mixed obstruction and restriction.[13]

This dissimilarity was likely due to the great distinction of air pollution levels between Bogor and Delhi. The PM_{10} level of Delhi residential areas was 178 μg/m^3. The traffic-congested areas of Delhi even reached 250 μg/m^3, while the PM_{10} level in Bogor in this study was only 131.2 μg/m^3. Moreover, the mean SO_2 level at residential and traffic areas in Delhi was 9 μg/m^3 while in Bogor during this study was only 1.7 μg/m^3. The NO_2 level in residential areas of Delhi was 44 μg/m3 and at traffic-congested areas, it even reached 83 μg/m^3, while in Bogor during this study was only 15.6 μg/m^3. This study also assessed abnormalities of the chest cavity and lung parenchyma using CXR. There were 8.4% CXR abnormalities found (8 of the 95 people examined). Chest X-ray abnormalities found in this study included calcification, infiltrates, aortic elongation, cardiomegaly, and left ventricular hypertrophy.

Lung function is affected by several factors including age, gender, height, and race. In addition, it is also influenced by several diseases such as airway obstruction, emphysema, fibrosis, tuberculosis, atelectasis, chest wall deformities, neuromuscular disease, heart failure, and space-occupying lesions in the pleura or parenchyma.[14] Kohansal et al in 2009 pointed out that men who had never smoked would experience a decline in FEV_1 of 19.6 ml/year and that of smokers would decrease by 38.3 ml/year.[15] A classic study by Fletcher and Peto in 1977 indicated that subjects experienced a decrease in FEV_1 each year after the age of 25 but non-smoker subjects had never experienced obstruction (obstruction prevalence 0%). Subjects who were heavy smokers experienced obstruction as much as 46% while mild smokers were 24%.[16] In this study, the results of statistical analysis using Fisher's absolute test showed a significant correlation between the age of subjects and the spirometry results in the age group of 51-60 years (P=0.024), but not significant after multivariate analysis.

Based on the correlation between age and decreased lung function, 3 subjects were <30 years old, 1 subject was 40 years old and 3 subjects were >50 years old. From the Fisher's absolute test analysis, there was a significant correlation between the age of the subject and the spirometry results in the 51-60 years age group (P=0.024). Obesity is a complex problem that is often associated with

comorbidities and mortality. Data from New York Metropolitan Life Insurance showed that in the 48-69 years age group, the mortality rate of the obese male was 42% greater than the average and that of obese female was 36% greater than the average.[17] Study conducted on Norwegian subjects aged 25-34 years male and female with BMI >31 kg/m^2 discovered that those subjects had twice the mortality rate as subjects with normal body weight. One of the diseases associated with obesity is respiratory problems. Some literature stated that obese people tended to experience decrease respiratory function compared with those who were not obese.[14]

Obesity is determined by a simple indirect examination using BMI calculation that divides body weight (in kilograms) by height (in square meters/m^2). This method is frequently used by clinicians. Hakala et al in a study that used multiple regression analysis, showed that each kilogram of weight gain was associated with a 26 ml decrease in FVC and 23 ml decrease of FEV_1 in male subjects, whereas in female there were 14 ml and 9 ml decreases, respectively. Obesity affects respiratory mechanisms and lung volume through the increased amount of fat in the chest wall and abdomen which may have an impact on the mechanical properties of the chest and diaphragm and indicate changes in respiratory function. This mechanism decreases lung volume and changes ventilation with each respiration.[18]

Our study found out that there was no significant correlation between habitual use of masks and impaired lung function (*P*=1,000). This insignificant result was different from Wongsurakiat et al (19). who found that traffic policemen who did not wear masks had a significantly higher prevalence of abnormal FEV_1 and FVC compared to the control group, 35% vs 14%, respectively (*P*=0.046). The study by Wongsurakiat et al stated that traffic policemen who did not use protective masks had a relatively higher risk of experiencing abnormal FEV_1 and FVC compared to the control group who used protective masks.[20]

This difference was likely since API level in Bogor was still far below the national air quality standard. It was widely known that the inappropriate use of masks led to a higher risk of exposure to pollutant particles. Long-term exposure to pollutants and the inappropriate use of masks were associated with decreased lung function. Seven subjects with declined lung function had a history of inadequate use of PPE. Of the 3 subjects who never wore a mask, 1 subject experienced mild obstruction and 2 subjects had mild restriction. Four subjects wore masks but with poor use of masks. Of those 4 subjects, 3 subjects had a mild obstruction and 1 subject had mixed disorders (mild restriction and mild obstruction). There was no significant correlation between the period of duty with lung function (*P*=1,000).[10]

Although the correlation between the period of duty and lung function was not significant, it seemed that the period of duty tended to be associated with occupational lung disease and further study is needed to prove it. Zafar et al. categorized their study subjects into 2 groups: subjects who served less than 10 years and those who served ≥10 years. The study also compared the two groups based on the level of pollution (mild, moderate, and high).[10]

There was a significant decline in FVC and FEV_1 of the traffic policemen in Bangkok who worked in areas with high levels of air pollution. The traffic police also often complained of coughing and rhinitis compared to the control group.[19] There was no correlation between the period of duty and lung function abnormalities. Of the 7 subjects with lung function abnormalities, 3 subjects had a period of duty less than ten years (7 years), while the other 4 subjects had a period of duty more than ten years (23, 25, 26, and 38 years). In this study, the period of duty was categorized into 3 groups, namely 0 to 6 years, 6 to 10 years, and more than 10 years. In the group of subjects who worked between 0-6 years, none experienced lung function abnormalities. This may be due to the short period of duty and optimal lung function. Thanks to the Bogor Traffic Police Department for providing access to the study.

CONCLUSION

The Bogor area, as a satellite of the capital city of Jakarta, had a relatively good air quality during the study. The prevalence of lung function disorders based on spirometry results in Bogor traffic policemen during the study was 7.4%. The prevalence of smoking was still quite high and the proper use of PPE among traffic police officers was still low. There was no significant correlation between smoking habits, masks usage and period of duty with lung function but there was a significant correlation between age and BMI with lung function in this group.

REFERENCE

1. United Nations Environment Programme. Global Environment Outlook 2000. 1999.
2. Pencemaran udara dan sektor transportasi [Internet]. [cited 2016 Jul 14]. Available from: http://www.bplhdjabar.go.id/bid angpengendalian/subidpemantau anpencemaran/94
3. Badan Pusat Statistik Kabupaten Bogor. Profil Daerah Kabupaten Bogor. Badan Pusat Statistik Kabupaten Bogor.
4. Sastroasmoro S, Ismael S. Dasar-dasar metodologi penelitian. 3rd ed. Jakarta: Sagung Seto; 2007.
5. Balmes JR. Occupational respiratory diseases. Prim Care. 2000;27(4):1009–38.
6. Pal P, John RA, Dutta TK, Pal GK. Pulmonary function test in traffic police personnel in Pondicherry. Indian J Physiol Pharmacol. 2010;54(4):329–36.
7. World Health Organization. GATS| Indonesia Global Adult Tobacco Survey: Indonesia Report. New Delhi; 2012.
8. Kleinman EJ, Cucco RA, Martinez C, Romanelli J, Berkowitz I, Lanes N, et al. Pulmonary function in a cohort of New York City Police Department emergency responders since the 2001 World Trade Center disaster. J Occup Environ Med. 2011;53(6):618–26.
9. Jafary Z, Faridi I, Qureshi H. Effects Of Airborne Dust On Lung Function Of The Exposed Subjects. Pak J Physiol. 2007;3.
10. Wongsurakiat P, Maranetra KN, Nana A, Naruman C, Aksornint M, Chalermsanyakorn T. Respiratory symptoms and pulmonary function of traffic policemen in Thonburi. J Med Assoc Thai. 1999;82(5):435–43.
11. World Health Organization. Review of evidence on health aspects of air pollution-REVIHAAP Project: Technical Report. Denmark; 2013.
12. Central Pollution Control Board Ministry of Environment & Forests. Epidemiological Study on Effect of Air Pollution on Human Health (Adults) in Delhi. Delhi: Chandu Press; 2012.
13. West JB. Structure and function - How the Architecture of the Lung Subserves its Fuction. In: Respiratory Physiology: the essentials. Baltimore: Williams and Wilkins Company; 2015. p. 1–169, 143.
14. Kohansal R, Martinez-Camblor P, Agustí A, Buist AS, Mannino DM, Soriano JB. The natural history of chronic airflow obstruction revisited: an analysis of the Framingham offspring cohort. Am J Respir Crit Care Med. 2009;180(1):3–10.
15. Fletcher C, Peto R. The natural history of chronic airflow obstruction. Br Med J. 1977;1(6077):1645–8.
16. Hakala K, Mustajoki P, Aittomäki J, Sovijärvi AR. Effect of weight loss and body position on pulmonary function and gas exchange abnormalities in morbid obesity. Int J Obes Relat Metab Disord. 1995;19(5):343–6.
17. Heatherton TF, Kozlowski LT, Frecker RC, Fagerström KO. The Fagerström Test for Nicotine Dependence: a revision of the Fagerström Tolerance Questionnaire. Br J Addict. 1991;86(9):1119–27.
18. Chatkin J, Fritscher L, de Abreu C, Cavalet-Blanco D, Chatkin G, Wagner M, et al. Exhaled carbon monoxide as a marker for evaluating smoking abstinence in a Brazilian

population sample. Prim Care Respir J. 2007;16(1):36–40.

19. Sabzwari SR, Fatmi Z. Comparison of exhaled carbon monoxide levels among commuters and roadside vendors in an urban and a suburban population in Pakistan. Environ Monit Assess. 2011;180(1–4):399–408.
20. Hampson NB, Piantadosi CA, Thom SR, Weaver LK. Practice recommendations in the diagnosis, management, and prevention of carbon monoxide poisoning. Am J Respir Crit Care Med. 2012;186(11):1095–101.