

## Air Polution Causes Some Problems for Traders in Amplas Terminal

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### Abstract

*This study aims to determine and analyze the relationship between carbon monoxide levels and health complaints on Traders at Amplas Terminal. This study uses an analytical survey method with a cross-sectional study design. The population in this study were All Traders who carried out trading activities at the Amplas Terminal, as many as 53 people. Samples of air pollution from carbon monoxide gas located at the center of pollution by transportation and based on points of location where trading is at the Amplas Terminal. The data analysis method in this study used bivariate analysis. The results showed that there was no relationship between carbon monoxide levels and health complaints on Traders at Amplas Terminal.*

### Keywords

carbon; monoxide levels; health complaints; traders



## I. Introduction

Air pollution is generally defined as the presence of several chemicals in the air in sufficient quantities to disturb and harm humans, animals, plants, and the environment (Syech et al., 2013). Meanwhile, in accordance with Government Regulation Number 41 of 1999, regarding air pollution refers to activities where substances, energy or other components enter or enter the surrounding air, thereby reducing the quality of the surrounding air to a certain extent. Air pollution is caused by traffic activities sourced from cars. Cars produce nitrogen dioxide (NO<sub>2</sub>), carbon monoxide (CO), SO<sub>2</sub>, ozone (O<sub>3</sub>), HC and particulates. Almost all human activities currently emit pollutants into the atmosphere. The impact of pollution on human activities will not only affect the natural environment, but will also affect crops and livestock, reduce agricultural productivity, and even cause human disease and possibly death. The pollution levels that have been reached are causing worldwide concern. Environmental pollution is unavoidable and is increasing every day (Ruhban and Nurwahidah, 2017).

One of the places that also contributes to air pollution is the bus terminal/city. A large number of vehicles circulate in the terminal, which is generated by the circulation of harmful air pollutants that tend to affect human health (Utama, 2019). The increasing need for transportation is currently a concern. Many government and private parties provide transportation services to meet these needs. In organizing the transportation activities, a terminal is provided. The terminal is a gathering place for humans from various places to come or go by means of transportation, so safety and health guarantees are needed in it (Mukono, 2011).

Medan is the capital city of North Sumatra Province and the third largest city in Indonesia, with a population of 2,247,425 (Badan Pusat Statistik, 2017). And increased in 2019 to 2,279,894 residents. In the field of transformation, especially urban areas, progress is increasing along with the increase in the number of existing vehicles. This increasing

progress is also in line with the growth of the urban population, the development of the community's economy and high work activities. Community work activities are high, highly dependent on means of transportation. From 2013 to 2018 for passenger cars, from  $\pm 11,484,514$  units, it rose to  $\pm 16,440,987$  units. Bus cars from  $\pm 2,286,309$  units rose to  $\pm 2,538,182$ . Meanwhile for goods cars  $\pm 5,285,061$  units rose to  $\pm 7,778,544$  units. And for motorcycles from  $\pm 84,732,652$  it rose to  $\pm 120,101,047$  units. Of course, with the increasing number of transportation facilities used, it must be balanced with adequate road facilities.

One of the pollutants produced by motorized vehicles is carbon monoxide. Carbon monoxide is a colorless, odorless and tasteless gas with small amounts in the air, around 0.1 ppm in the atmosphere, therefore the environment polluted by carbon monoxide gas cannot be seen by the eye.

The large number of vehicles, especially in the terminal also affects carbon monoxide gas levels. Vehicles that stop while waiting for passengers and keep the vehicle engine running. This can cause incomplete combustion so that it will form carbon monoxide gas.

The results of Megalina's research (2015) that air pollution in the Amplas Terminal that is often found is air pollution due to exhaust gases from motorized vehicles and also cigarette smoke from drivers and passengers of buses, public transportation, cars, and other vehicles.

In Putri's research (2017) conducted at the Amplas toll gate and Tanjung Merawa toll road, it was concluded that the number of vehicles has a strong correlation with the concentration of carbon monoxide, where the more the number of motorized vehicles, the concentration of carbon monoxide also increases. Temperature has a weak correlation with carbon monoxide concentration and inversely, where the higher the temperature, the lower the carbon monoxide concentration. Humidity has a very weak correlation and is directly proportional, where the higher the humidity, the carbon monoxide concentration will also increase. The results of Riani's research (2017) conducted at the Kampung Rambutan terminal in Jakarta, the average concentrations of SO<sub>2</sub>, NO<sub>2</sub>, and TSP were 45.72  $\mu\text{g}/\text{Nm}^3$ , 168.97  $\mu\text{g}/\text{Nm}^3$ , and 133.3  $\mu\text{g}/\text{Nm}^3$ . And subjective complaints of respiratory disorders that are felt are sneezing (68.1%).

This study aims to determine and analyze the relationship between carbon monoxide levels and health complaints on Traders at Amplas Terminal.

## **II. Research Methods**

This study uses an analytical survey method with a cross-sectional study design. An analytical survey is a survey or research that tries to explore how and why a phenomenon occurs, meaning that each research subject is only observed once and measurements are made on the status of the character or variable of the subject at the time of examination (Pandiangan et al., 2021). The cross-sectional study design only observed once and measurements were made on the subject variables at the time of the study (Pandiangan, 2015).

Population is a group of individuals with the same characteristics and living in the same place (Pandiangan et al., 2018). The population in this study were All Traders who carried out trading activities at the Amplas Terminal, as many as 53 people. The sample is part of the population that has characteristics similar to the population itself (Pandiangan, 2018). Samples of air pollution from carbon monoxide gas located at the center of pollution by transportation and based on points of location where trading is at the Amplas Terminal.

The data analysis method in this study used bivariate analysis. Bivariate statistical test was conducted to determine whether there was a relationship or difference between each independent variable and the dependent variable (Tobing et al., 2018). The selection of

statistical tests is based on the type of data whether the variable is numerical data (ratio scale) or categorical (nominal or ordinal scale). If the two variables analyzed are categorical, then the chi-square test is used with the condition that no cells have an expected count of less than 5, more than 25% of the total number of cells.

### **III. Discussion**

#### **3.1 Description of Research Site**

Amplas Terminal is the largest terminal in Medan City, this terminal was built based on a decision from the Regional Development Planning Agency (BAPPEDA) managed by the Land Transportation Management Center (BPTD) Region II North Sumatra Province. The location of the Amplas terminal is Jalan Pertahanan Medan Tenggara, Timbang Deli Village, Medan Amplas District, Medan City. Amplas Terminal area is 50,961 M<sup>2</sup> and is currently in the stage of revitalization and development.

Amplas Terminal began operating on July 15, 1991. In 1991–2002 the Amplas integrated terminal was managed by the Department of Transportation and Regional Development Companies (PD Pembangunan). In 2003–2009 the Amplas Terminal was managed by the Department of Transportation. 2009–now the Amplas Terminal is managed by the Department of Transportation assisted by the police to control security in and around the terminal. Amplas Terminal is an integrated land transportation terminal in Medan City, serving buses between provinces and within provinces that come from the south of Medan City. Buses in this terminal serve routes between the provinces of Riau, West Sumatra, Jambi, South Sumatra, Lampung and Jakarta via the Sunda Strait. In addition, this terminal is also the departure point for Damri buses to Kualanamu international airport. City transportation at the Amplas terminal includes Mitra 30, Rahayu Medan Ceria and Mitra 63. Then for the cross-provincial fleet, namely AKDP, the number of fleets reaches 114 units. Some of them are Medan Jaya, Sejahtera, and Teman Bus Medan.

Inside the Amplas terminal there are also traders selling food and drinks for passengers. Amplas Terminal has the following regional boundaries:

1. In the west, it is bordered by the village of Harjosari I/II.
2. To the east, it is bordered by the village of Rangun Setia.
3. To the north it is bordered by the Amplas Village.
4. To the south, it is bordered by the Patumbak Village.

#### **3.2 Carbon Monoxide**

Carbon monoxide (CO) is a colorless and odorless gas produced from incomplete combustion of carbon-based materials such as wood, coal, fuel oil and other organic substances. Cological citizenship is a new idea that is strived to shape the awareness of citizens in forming a whole human being in the involvement of protecting the environment (Ridwan, 2020). Every fire victim must be suspected of carbon monoxide gas intoxication. Carbon monoxide gas is the leading cause of poisoning deaths in the United States and more than half of all other fatal poisonings worldwide. Approximately 40,000 patient visits per year in the emergency department in the United States are associated with cases of carbon monoxide gas intoxication with a mortality rate of around 500-600 per year that occurred in the 1990s. Around 25,000 cases of carbon monoxide poisoning per year are reported in the UK. With a death rate of around 50 people per year and 200 people suffering from severe disabilities due to carbon monoxide gas poisoning. In Singapore, cases of carbon monoxide gas intoxication are rare. At the Tan Tock Seng Hospital in Singapore, 12 cases of carbon monoxide gas intoxication were reported in 4 years (1999-2003).

Misdiagnosis often occurs because of the variety of complaints and symptoms in patients. The symptoms that appear are often similar to those of other diseases. In the anamnesis specifically obtained a history of exposure to carbon monoxide gas. The symptoms that appear often do not match the level of HbCO in the blood. Patients with inhalation trauma or burns should be suspected of possible exposure to and poisoning with carbon monoxide gas. On examination of vital signs found tachycardia, hypertension or hypotension, hyperthermia, tachypnea.

### 3.3 Carbon Monoxide Level in Amplas Terminal

From the results of the study, it was found that the highest level of carbon monoxide in the morning measurement was at point III, which was 3,750  $\mu\text{g}/\text{m}^3$ , for the afternoon measurement, the highest carbon monoxide level was at point II at 8,750  $\mu\text{g}/\text{m}^3$ , and for the highest carbon monoxide level in the afternoon measurement was at point III is 6,250  $\mu\text{g}/\text{m}^3$ . The measured carbon monoxide levels still meet the quality standard requirements according to the Government Regulation of the Republic of Indonesia Number 22 of 2021, which is 10,000  $\mu\text{g}/\text{m}^3$  for 1 hour measurement.

The carbon monoxide levels from the three points above are the highest in point II, because this location is a location for buses to wait for departing passengers and also a place for customers to park vehicles. When the bus is waiting for the arrival of passengers, the bus usually stays on so that it can release more carbon monoxide gas into the air.

Carbon monoxide gas produced by gasoline-engined vehicles (premium) is about 1% at run time and about 7% when not running, while diesel engines produce carbon monoxide gas by 0.2% when running and about 4% at stop time. The transportation sector has a high dependence on energy, the use of this energy comes from fuel oil (BBM) which emits carbon monoxide compounds. The more waste combustion products from human activities in the form of carbon monoxide in the air, the air quality will decrease (Sarudji, 2010).

To avoid the occurrence of pollution with a higher level, it is better to arrange the terminal space, including the arrangement of facilities and infrastructure that are always used by visitors, traders, and officers of the Transportation Service Office of the Amplas Terminal. Currently, spatial planning at the Amplas Terminal is being carried out by the Department of Transportation in collaboration with related parties, and is expected to be in accordance with environmental health and cleanliness.

### 3.4 Bivariate Analysis Results

Bivariate analysis aims to determine whether there is a relationship between the independent variable and the dependent variable. This analysis uses the Chi-Square test with the assumption that if  $p < 0.05$ , it can be concluded that there is a significant correlation between the variables connected.

**Table 1.** Relationship between Carbon Monoxide Levels and Health Complaints

| Test Statistics                           |      |
|---|------|
| Carbon Monoxide Levels- Health Complaints |      |
| Asymp. Sig. (2-tailed)                    | .102 |

The results showed that there was no relationship between carbon monoxide levels and health complaints on Traders at Amplas Terminal, because asymp. sig (2-tailed) 0.102 > 0.05).

## IV. Conclusion

The results showed that there was no relationship between carbon monoxide levels and health complaints on Traders at Amplas Terminal.

Suggestions in research are:

- 1) For the Medan City Environment Agency  
Conduct regular ambient air quality measurements in public places, including terminals in the city of Medan.
- 2) Medan City Transportation Service  
Checking vehicle engines regularly to reduce pollutant levels. Carry out tree planting movements to help absorb pollutant levels in the air.
- 3) Medan City Health Office  
Conduct counseling, especially to traders who sell at the Amplas terminal about the dangers of pollutant gases in the air.
- 4) Traders at Amplas Terminal  
Use personal protective equipment such as masks when selling to avoid inhaling air pollutant gases. Consuming nutritious food to increase endurance.

## References

- Badan Pusat Statistik. (2017). <http://bps.sumutprov.go.id/>. Accessed 20 Februari 2020.
- Megalina, Y. (2015). Pengaruh Pencemaran Udara di Daerah Terminal Amplas Bagi Kehidupan Masyarakat. *Jurnal Pengabdian Kepada Masyarakat*, 21(79).
- Mukono, H. (2011). Pencemaran Udara dan Pengaruhnya Terhadap Gangguan Saluran Pernapasan. Surabaya: Airlangga University Pers.
- Pandiangan, Saut Maruli Tua. (2015). Analisis Lama Mencari Kerja Bagi Tenaga Kerja Terdidik di Kota Medan. Skripsi. Medan: Fakultas Ekonomi dan Bisnis, Program Studi Ekonomi Pembangunan, Universitas Sumatera Utara. [https://www.academia.edu/52494724/Analisis\\_Lama\\_Mencari\\_Kerja\\_Bagi\\_Tenaga\\_Kerja\\_Terdidik\\_di\\_Kota\\_Medan](https://www.academia.edu/52494724/Analisis_Lama_Mencari_Kerja_Bagi_Tenaga_Kerja_Terdidik_di_Kota_Medan).
- Pandiangan, Saut Maruli Tua. (2018). Analisis Faktor-faktor yang Mempengaruhi Penawaran Tenaga Kerja Lanjut Usia di Kota Medan. Tesis. Medan: Fakultas Ekonomi dan Bisnis, Program Studi Ilmu Ekonomi, Universitas Sumatera Utara. <http://repositori.usu.ac.id/bitstream/handle/123456789/10033/167018013.pdf?sequence=1&isAllowed=y>.
- Pandiangan, Saut Maruli Tua, Rujiman, Rahmanta, Tanjung, Indra I., Darus, Muhammad Dhio, & Ismawan, Agus. (2018). An Analysis on the Factors which Influence Offering the Elderly as Workers in Medan. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 23(10), 76-79. DOI: 10.9790/0837-2310087679. <http://www.iosrjournals.org/iosr-jhss/papers/Vol.%2023%20Issue10/Version-8/K2310087679.pdf>.
- Pandiangan, Saut Maruli Tua, Resmawa, Ira Ningrum, Simanjuntak, Owen De Pinto, Sitompul, Pretty Naomi, & Jefri, Riny. (2021). Effect of E-Satisfaction on Repurchase Intention in Shopee User Students. *Budapest International Research and Critics Institute-Journal*, 4(4), 7785-7791. DOI: <https://doi.org/10.33258/birci.v4i4.2697>.
- Putri, I. (2017). Analisis Pengaruh Jumlah Kendaraan Bermotor dan Faktor Meteorologi Terhadap Konsentrasi Karbon Monoksida (CO) di Udara Ambien Roadside (Studi Kasus: Pintu Tol Amplas dan Pintu Tol Tanjung Morawa).

- Riani, P. D. (2017). Gambaran Kualitas Udara Ambien (SO<sub>2</sub>, NO<sub>2</sub>, TSP) Terhadap Keluhan Subyektif Gangguan Pernapasan pada Pedagang Tetap di Kawasan Terminal Bus Kampung Rambutan Jakarta Timur Tahun 2017. Jakarta: Universitas Islam Negeri (UIN) Syarif Hidayatullah.
- Ridwan, F.T., Gunawati, D., and Triastuti, R. (2020). Strategy for Development of Ecological Citizens by Walhi Yogyakarta through Community-Based Education in Communities Gunung Sewu. Budapest International Research and Critics Institute-Journal (BIRCI-Journal) Vol 3 (2): 1095-1104.
- Ruhban, A & Nurwahidah. (2017). Tingkat Kuantitatif Pencemaran Logam Berat Pb dalam Udara Ambien di Terminal Malengkeri Kota Makassar. Jurnal Sulolipu, 17(1).
- Sarudji, D. (2010). Kesehatan Lingkungan. Bandung: Karya Putra Darwati.
- Syech, R., Anthika, & Sugianto. (2013). Pengaruh Suhu, Kelembaban Udara dan Kecepatan Angin terhadap Akumulasi Nitrogen Monokaisa dan Nitrogen Dioksida. Universitas Riau.
- Tobing, Murniati, Afifuddin, Sya'ad, Rahmanta, Huber, Sandra Rouli, Pandiangan, Saut Maruli Tua, & Muda, Iskandar. (2018). An Analysis on the Factors Which Influence the Earnings of Micro and Small Business: Case at Blacksmith Metal Industry. Academic Journal of Economic Studies, 5(1), 17-23. <https://www.cceol.com/search/article-detail?id=754945>.
- Utama, D. (2019). Indeks Standar Pencemar Udara Polutan Karbon Monoksida (CO) di Terminal Malangkeri Kota Makassar. Jurnal Nasional Ilmu Kesehatan, 2(1).