



Assessment of Auto-rickshaw Drivers Knowledge Regarding the Effects of Air Pollution on Health and Its Prevention

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Air pollution is the major environmental pollution that contains different types of gases, dust particles, small molecules, etc. Air pollution is mainly caused by smoke or other harmful gases, such as oxides of carbon, sulfur, and nitrogen. Auto-rickshaw drivers are not only affected by air pollution, they are exposed to climatic changes, and poor road conditions. They are exposed to air pollution, dust, infected droplets, job insecurity, noise pollution and vibration, business demands, damage to their vehicles, and, schedule-related pressure. Drivers also have the responsibility of their passengers and pedestrians- 'lives and other vehicles. The objective of the study is to analyze knowledge among auto-rickshaw drivers regarding the health effects of air pollution and its prevention.

Methods: An observational research methodology, a cross-sectional research design was used to perform this analysis. Probability purposive sampling technique was used to collect data from auto-rickshaw drivers based on the health effects of air pollution and its prevention utilizing structured questionnaires. The sample attributes have been defined by frequency, percentage, after data collection. The Chi-square test was also used to figure out the correlation between knowledge and specified demographic variables.

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Results: The findings show that 1.67% of auto-rickshaw drivers had an average level of knowledge score, 38.33% of them were having good and 60 % of them were having an excellent level of knowledge score and none of them were found to have a very poor level of knowledge. The minimum knowledge score was 7 and the maximum knowledge score was 14. Hence it indicates that auto-rickshaw drivers have good knowledge about the effect of air pollution and their prevention.

Conclusions: The study shows that the auto-rickshaw drivers having good knowledge about air pollution to the management of respiratory diseases and along with their complications as well as to take the required measures to avoid respiratory complications.

Keywords: Effects; air pollution; prevention; auto-rickshaw drivers.

1. INTRODUCTION

Air pollution is a form of environmental pollution that influences the atmosphere and is commonly caused by smoke or other poisonous fumes, toxic gases, smoke from fuel, sulfur, and nitrogen oxides [1].

Air pollution is the contamination of air around us, which we breathe by the presence or introduction of substances that have a poisonous effect [2]. The contamination can be in the form of gas, liquid, or solid. It can also be a chemical such as oxide, hydrocarbon, acid, or other forms. Many pollutants pass from natural sources into the air. Dust, coastal salt, volcanic ash and coal, forest fire smoke, pollen, and other contaminants are among these toxins. There are two types of air pollution such as primary or secondary pollutants. Primary pollutants are toxins where humans or natural sources directly bring into the environment. For example vehicle exhaust gas, cigarette soot, dust, and volcanic eruptions of ash [3].

Secondary pollutants are substances combined with other main pollutants or natural resources such as water vapor. When the primary pollutant interacts with sunlight, several secondary contaminants are produced [4]. The secondary contaminants include ozone and smog. Ozone is a gas that removes weakened ultraviolet (UV) rays from the sun. However, when this gas comes in contact with humans and other species, it's very harmful [5].

People get respiratory diseases when they breathe this type of poor-quality air. According to the World Health Organisation, globally, poor ambient weather caused nearly 4.2 million premature deaths, about 90 percent of them in low- and middle-income countries. 3 billion people who use fuel such as burning wood, kerosene, and coal for cooking face a continual health

hazard from indoor smoke. According to the US Lung Association, almost 134 million people in the United States — more than 40% of the population — are at risk of cancer and premature death due to air pollution. Long-term exposure; to these pollutants can induce short-term issues like sneezing and coughing, inflammation of the lungs, headaches, and dizziness [6].

Air contamination is nowadays a familiar concept that we come across. We are getting aware of this topic through the news media as well [7]. Air can get contaminated either by indoor or outdoor air pollutants. This can cause physical, biological, or chemical changes in the air. The pollutants are poisonous gases, dust, and smoke that contaminate the air and it is challenging for plants, animals, and human beings to live when the air is polluted. Air pollution may also be categorized into two parts such as visible ambient pollution and invisible air pollution [8]. Air pollution is a material that is capable of hindering the environment or well-being of living creatures. The existence of living beings depends on a variety of atmospheric gases, any decrease or rise in the proportion of these gases can be detrimental to the survival of living beings [9].

The primary source of airborne disorders is air pollution. Air pollution is harmful to human health. The worst type of air pollutants is caused by fossil fuel combustion, particularly in domestic fuel engines. Mineral dust and gases, trucks, thermal power stations, and factories are the major sources of air pollution in India and elsewhere. The poor air quality will not only cause all kinds of diseases and vision loss but also affect the entire air system. Pollution of air will also contribute to acidic rain destroying the region's soil, plants, and marine life [10].

Auto drivers doing a very stressful task which has been associated with environmental interaction factors [11]. So the auto drivers are

work within the public environment, auto drivers exposed to adverse conditions, climate changes, and poor road conditions. Driving is a highly stressful task that is affected by environmental, social, and interpersonal interaction factors [12]. In addition to these factors, they are also exposed to irregular working hours, exposure to air pollution, dust, droplets, job insecurity, noise and vibration, business demands, damage to equipment, an excessive number of stops, schedule-related pressure, among others. Drivers' social role is also reflected in the responsibility for passengers' and pedestrians' lives and other vehicles [13].

2. METHODOLOGY

The present study was an observational study conducted on 60 auto-rickshaw drivers, selected in the auto stand in Wardha district. The study was conducted from September 2019 to September 2020. A non-probability purposive sampling technique was used to select the sample for this study. Based on the extensive review of various interventions, the cultural settings, and resources available, the customized intervention was designed to manage air pollution, and this included the following components.

Pretested predesigned semi-structured questionnaires were used for data collection. The questionnaire has been validated by the experts. The questionnaire consisted of two parts. Part one consisted of demographic data on auto-rickshaw drivers such as Age, education, income, year of experience, socio-economic status, and; duration of work per day. Part two consisted of 14 questions related to knowledge regarding the effects of air pollution on health and its prevention among auto-rickshaw drivers. For scoring the knowledge of each participant one score was allocated to each correct answer and zero to the incorrect answer.

Scores of 0% were considered poor knowledge and 1 to 1.67% were considered as average knowledge and 23 to 38.33% were considered as good knowledge however, scores of above 36 to 60% were considered as a very excellent level of knowledge. Furthermore, Auto rickshaw drivers who have already attended similar types of study and who were illiterate were excluded from our study. The concepts explored the purpose of the research. Before the induction of the study participants - consent was obtained. The confidentiality of the data was ensured.

Data collected were entered in a Microsoft Excel sheet. The statistical analysis was done by using EpiInfo 7. Frequencies and percentages were presented for categorical variables.

3. RESULTS

Table 1 indicates that most of the samples 43.30% of the auto-rickshaw driver were in the age group of 20-30 years, 40% of them were in the age group of 31-40 years, 13.30% of them were in the age group of 41-50 years and 3.30% of them were in the age group of more than 50 years. 8.30% of the auto-rickshaw driver were illiterate, 63.30% of them were educated up to primary standard, 20% up to secondary, and 8.30% of them were educated up to college university. 23.30% of the auto-rickshaw driver were having a monthly family income of 5000-10000 Rs, 56.70% of them were having between Rs 10001-15000 and 20% of them were having monthly family income of Rs 15001-20000 Rs. 65% of the auto-rickshaw driver were having working experience of 1-5 years, 31.70% had between 6-10 years and 3.30% of them were having working experience of 11-20 years. 31.70% of the auto-rickshaw drivers were lower class, 55% of them were lower middle class, 11.70% of them were from the middle class and 1.70% of them were from the upper-middle class. 35% of the auto-rickshaw driver were working for 7-8 hours in a day and 65% of them were working for 9-10 hours in a day.

Table 2 shows that 1.67% of auto-rickshaw drivers had an average level of knowledge, 38.33% had a good score and 60% had an excellent level of knowledge. The minimum score was 7 and the maximum score was 14. The mean knowledge score was 11.01 ± 1.57 and the mean percentage of knowledge score was 78.69 ± 11.27 .

The overall mean knowledge scores of auto-rickshaw drivers revealed that 60 % of auto-rickshaw drivers had an excellent level of knowledge score and 38.33 % of auto-rickshaw drivers had a good level of knowledge score.

3.1 Statistical Analysis

Statistical data analysis for the measurement of knowledge on the effects of air pollution on health and its prevention among auto-rickshaw drivers was carried out to assess the significant difference between such values. Analysis of the data was done by using descriptive and inferential statistics.

Table 1. Percentage-wise distribution of auto-rickshaw drivers according to their demographic characteristics n=60

Demographic Variables	No. of auto-rickshaw drivers (N= 60)	Percentage (%)
Age (year)		
20-30 year	26	43.3
31-40 year	24	40.0
41-50 year	8	13.3
>50 year	2	3.3
Education		
No Education	5	8.3
Primary	38	63.3
Secondary	12	20.0
College University	5	8.3
Income(Rs)		
5000-10000 Rs	14	23.3
10001-15000 Rs	34	56.7
15001-20000 Rs	12	20.0
20001-25000 Rs	0	0
Years of experience		
1-5 years	39	65.0
6-10 years	19	31.7
11-20 years	2	3.3
>20 years	0	0
Socio-economic Status		
Lower Class	19	31.7
Lower Middle Class	33	55.0
Middle Class	7	11.7
Upper Middle Class	1	1.7
Duration of work per day		
4-6 hours	0	0
7-8 hours	21	35.0
9-10 hours	39	65.0

Table 2. Assessment with the level of knowledge score n=60

Level of knowledge	Score Range	Level of Knowledge Score	
		No of Auto-Rickshaw drivers N = 60	Percentage
Poor	0-25%(1-5)	0	0
Average	26-50%(6-10)	1	1.67
Good	51-75%(7-15)	23	38.33
Excellent	76-100%(16-20)	36	60
Minimum score		7	
Maximum score		14	
Mean knowledge score		11.01 ± 1.57	
Mean % knowledge Score		78.69 ± 11.27	

In general, descriptive statistics are different from inferential statistics. The data describe that what is the data is or what it indicates with descriptive statistics. The inferential statistics stretch beyond the immediate facts and trying to reach the conclusion.

The software used in the analysis was Statistical Package for the Social Sciences (SPSS) 24.0

and Graph Pad Prism 7.0 version and $p < 0.05$ is considered as the level of significance.

3.1.1 Descriptive statistics

1. Mean percentage = Total Score/no. of questions
2. Max/Min = Maximum/Minimum value of knowledge score

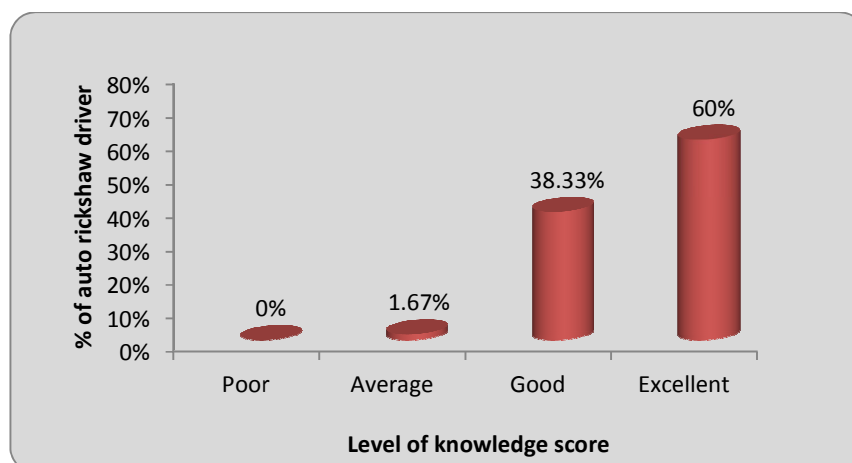


Fig. 1. Assessment with the level of knowledge score

3.1.2 Inferential statistics

Reliability analysis:

Guttman Split Half Method: Guttman Split half method of reliability is to calculate the reliability obtained by dividing the knowledge score into two halves i.e. even and odd. b The scores from the two halves will be compared to the consistency of the outcomes of various versions; to measure the reliability coefficient of the whole test/scale, the Spearman-Brown prophecies formula is used.

The Spearman-Brown prophecy formula is:

$$\text{Reliability } D_{xx'} = (2 * r / 1 + r) * 100$$

Where 'r' is the correlation between the half-tests.

$$r = \frac{\sum XY - \frac{\sum X \sum Y}{N}}{\sqrt{(\sum X^2 - \frac{(\sum X)^2}{N})(\sum Y^2 - \frac{(\sum Y)^2}{N})}}$$

4. DISCUSSION

The results of the research study have been examined in relation to the study goals and the outcomes of the other studies in this section. The present study was undertaken to assess the knowledge regarding the effects of air pollution on health and its prevention among auto-rickshaw drivers.

In a clinical study to High Prevalence of Chronic Respiratory Symptoms among Autorickshaw Drivers of urban Puducherry, South India. A total of 297 male auto-rickshaw drivers with a mean age of 40 years were included in this study. This

study found that three-quarters of the auto-rickshaw drivers had nonspecific respiratory symptoms based on the study tool. It was higher than that reported among the male population in Chennai (8%), a metro-city around 150 km from Puducherry. Such high prevalence could be because of prolonged exposure to traffic exhaust pollution. Auto-rickshaw drivers were driving auto-rickshaw for an average of 16 years. Also, on average, they spent 14 h/day on the roads and were exposed to traffic exhaust pollution. The result of the study was driving auto-rickshaw for an average of 16 (SD = 8.3) years. Around 64% of them had ever smoked. All of them were exposed to passive smoking, especially while waiting in the auto-stand., the prevalence of active smoking (64%) and passive smoking (100%) were high among auto-rickshaw drivers. The most common symptom was breathlessness on exertion (68%), followed by phlegm in the morning (22%), cough in the morning (21%), wheeze in the past 12 months (18%), and breathlessness on dust exposure (15%). The current study did not find any association between the prevalence of chronic respiratory symptoms and subject characteristics such as age, education, tobacco smoking habit, duration of occupation as auto-driver, and the total duration of driving per day [14].

In the course of a cross-sectional analysis in a Public bus stand (South) from September 2015 to 2017 on bus drivers of Kochi, the interview was conducted among 300 bus drivers and conductors using a locally adapted version of the ATS-DLD-78-A questionnaire. With the help of Mini Wright's peak flow meter and portable spirometer, the lung function assessment was done. Using Microsoft Excel and Statistical

Package for the Social Sciences (SPSS)v20 data tabulated. The result of the study was as follows - 9.97% (95% CI 7.34–14.66) and chronic respiratory symptoms were found to be 19.2% (95% CI 14.58–23.82). On logistic regression, the independent predictors for the CRD were found to be working for more than 15 h/day (OR 2.815, 95% CI 1.26–6.28) and working for more than 4 days/week [15].

A study was conducted on the Health Status of Auto Rickshaw Drivers in Vashi, Navi Mumbai, India. There are Considering 1,500 registered auto-rickshaws were selected in this study, A Standardized Questionnaire was developed to gather data on the part of qualified physicians, including socio-demographic variables, workplace information, the perceived stress scale, Nordic Musculoskeletal Questionnaire (NMQ), information on the dependence stage, current symptoms and significant past and systemic disease background. Tests were carried out on bone mass density (BMD), spontaneous blood glucose levels. The review of data is performed with Microsoft Excel and Epi Info. There were 159 drivers included in the study results. The majority 82 (51.6%) of the categories were class III, 37 (23.3%) were class IV, and 40 (25.1%) were class II Among those, 54 (33.9%) drivers were in the profession for 10 to 19 years, while 36 (22.7%) were driving for 20 years or more. Only 19 (11.9%) drivers were asymptomatic, while 140 (88.1%) had one or more complaints. In this study, the commonest complaint of auto-rickshaw drivers was musculoskeletal pain in 95 (59.9%). Generalized fatigue, acidity, and headache were other common complaints. Ninety-seven (61.1%) drivers had osteopenia. Their a significant association between age and the number of years in the profession. Substance abuse was found in 95 (59.7%) of the study participants [16].

A study of cardiovascular disease risk factors among auto: Rickshaw drivers in Gwalior city, M.P.The present study has been undertaken in Gwalior city, Madhya Pradesh, India. It is a cross-sectional study of 300 Auto-rickshaw drivers working in Gwalior city that are included in this present study. A simple random sampling technique was used to collect the data. The researcher each day was visited 2 stands and interviewed 2 Auto-rickshaw drivers daily from each stand and collect the required information from the subjects till the required sample size was met. This study was done. July 1st, 2013 to July 1st, 2014 (one year). In this study, there are

two components of the study for the data collection and measurement i.e. Questionnaire-based survey and Anthropometric measurements and physical examination. The result of the study was 42% of Subjects had a habit of tobacco chewing, while 54% of subjects had a habit of tobacco smoking, 52% had a habit of alcohol consumption. The prevalence of overweight was 26% and central obesity was 6%. The prevalence of hypertension was 23% while prehypertensives were 37% [17].

5. CONCLUSION

The researcher as part of her post-graduate program conducted observational research on the topic to assess the knowledge regarding the effects of air pollution on health and its prevention among auto-rickshaw drivers. The researcher wanted to check the level of knowledge of auto-rickshaw drivers. Even today, many are unaware of the risks and effects of air pollution that can cause respiratory diseases. Certain objectives were predetermined before the study was started. The objectives were adequate to reach the findings. A particular period was allocated for each step. Investigator had presented her hypothetical views about the study in its beginning. The result of this study showed that 38.33% had a good level of knowledge and 60% had an excellent level of knowledge. By using Guttman Split Half method of reliability, it was found to be 0.8610. Further studies with the involvement of family members and caretakers to provide proper resources aiding in air pollution management are needed to study the real impact of air pollution.

CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

The study was started after obtaining permission Ref. no: DMIMS (DU)/IEC/Dec-2019/8648 from the Institutional Ethics Committee (IEC), Datta Meghe Institute of medical sciences (Deemed to be University) Sawangi (Meghe), Wardha.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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