Research article

A study to assess the knowledge regarding effects of air pollution on health and its prevention among auto rickshaw drivers of Bagalkot: with a view to develop an information booklet

Abhaykumar Shamrao Gaikwad

Sajjalashree Institute of Nursing Sciences, Bagalkot, India**.**

Abstract

Aim: The author wishes to assess the knowledge regarding effects of air pollution and its prevention among the auto rickshaw drivers at Bagalkot city with a view to prepare an information booklet.

Material and method: A descriptive study was conducted. Convenient non random sampling method was used to select the sample. The study sample included a sample of 100 auto rickshaw drivers. A structured interview schedule was prepared and used for data collection.

Results: The results of the study clearly indicated that out of 100 subjects 53 (53 %) of subjects' had medium knowledge, 46 (46 %) subjects had inadequate knowledge and only 01 (1 %) had adequate knowledge regarding effects of air pollution on health and its prevention. The total mean percentage was 36.50% with total mean 15.33 and standard deviation 5.30.

Conclusion: The significant association was found between level of knowledge and years of experience of study subjects. ($\chi^2 = 6.81$, p<0.05) and significant association between level of knowledge and sources of information regarding health. ($\chi^2 = 9.15$, p<0.05). Therefore, the research hypothesis H_2: There will be significant relationship between knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention and their selected socio-demographic variables was accepted.

Keywords: Air pollution. Rickshaw, information booklet

***Corresponding author:** Mr. Abhaykumar Shamrao Gaikwad, Sajjalashree Institute of Nursing Sciences, Bagalkot, India**.**
Email id: gaikwadabhaykumar5@gmail.com

1. Introduction

Air is an important environmental resource. Air is a part of Earth's atmosphere and one of its most important natural resources. Air is shared by all- humans, animals and plants to sustain life. Clean air is something we all need for good health and wellbeing. Human beings need continuous supply of air. The requirement of air per person is relatively constant (about 10-20 cubic meter per day). The composition of external air by volume is approximately, Oxygen- 20.96 percent, Carbon dioxide-

0.03 percent and Nitrogen 78.10 percent. The balance is made up with other gases such as Argon, Neon, Krypton, Xenon and Helium. In addition to these gases air also contains water vapors, traces of ammonia and suspended matter such as dust, bacteria, spores and vegetables debris [1]. Under ordinary conditions the composition of outdoor air is remarkably constant which is maintained by self cleansing mechanism, as wind dilutes and sweeps away impurities by its movement, the sunlight and atmospheric temperature oxidizes impurities and kills bacteria, the rain cleans and removes suspended and gaseous impurities, the plant life utilizes carbon dioxide and generates oxygen in day time. [2]

The air has been constantly polluted due to miscreant deeds of human beings. Air is said to be polluted when physical, chemical and biological agents are present in it to such an extent that they become harmful to humans.

Five main classes of human generated air pollutants are

1. Carbonmonoxide 2. Sulphur oxides 3. Hydrocarbons 4. Nitrogen dioxides 5. Particulates. The three drastic consequences of air pollution are Acid rain, Depletion of ozone layer and Warming of Earth called the "Green house effect." [1] Air pollution kills an estimated 2.7 million to 3 million people every year. Nine out of ten deaths to air pollution takes place in the developing world where 80 percent of all people live. World Health Organization estimated that about 7,00,000 deaths annually could be prevented in developing countries if atmospheric pollutants were brought down to safer levels. Increased urbanization and economic activities have increased vehicular traffic using diesel and petrol, both of which cause emission of Nitrous oxide and Sulphur dioxide. Heavy vehicles, which use diesel as fuel, emit large quantities of respirable suspended particulate matter. Diesel engine generates 1400 times more particles than petrol engine. Approximately10, 00,00,00,00,000 particles enter in to the lungs of each human being every day. In India millions of people breathe air with high concentrations of dreaded pollutants. The air is highly polluted in most cities. This has led to an incidence associated health effects on the population manifested in the form of sub clinical effects, impaired pulmonary functions, reduced physical performances, frequent medical consultations and even death in the exposed population. As per World Bank study, respiratory infections contribute to 10.9 percent of the total burden of diseases. [3]

Because of urbanization and industrialization, the road based passenger transport has recorded very high demands. The total number of motor vehicles has increased from 0.3 million in 1951 to 67 million in 2003, whereas the share of public transport has severely declined from 11 percent to 1.1 percent in same period. [3] The high growth of private vehicles such as 2-wheelers, 3- wheelers, and cars has led in to severe traffic congestion, crawling traffic, and increase in accident, fuel wastage and environmental pollution. Vehicle emissions are responsible for 70 percent of the country's air pollution. Exhaust from vehicles has increased eight fold over levels of twenty years ago; industrial pollution has risen four times over same period. The economy has grown two and half times over the past two decades but pollution control and civil services have not kept the same pace [4]. Auto rickshaw contribute a major part in private passenger transport because it is one of the chief modes of transport in India and also popular in many other countries. It is extremely light vehicle considering its capacity. A majority of Indian auto rickshaw have no doors and seat belts. It is extremely unsafe class of vehicle. Their design varies considerably from place to place. Not restricted to cities auto rickshaw is also prevalent in large numbers in Indian villages and in the countryside.
Major auto rickshaw manufactures in India are Bajaj Auto, Piaggio Greaves, Force motors, Atul Auto and

Kerala Automobiles. As a mode of transport the auto rickshaw is turning out to be transport employer in India [5]. Urbanization and industrialization offers plenty of jobs to people. Thus people from surrounding villages and extended areas travel to and fro for jobs. As the public transport is deficient and infrequent the private transport especially shared auto rickshaw plays a major role in transporting the people. People find this version more economical since more people share the fare. During transport the auto rickshaw are always overloaded carrying people more than its capacity and to earn more money the number of trips is also increased whereas less attention is given to the maintenance of auto rickshaw and the fuel used. It contributes to the major air pollution source, which affects the health of auto rickshaw drivers, itself. Thus it is extremely important that the auto rickshaw drivers must be aware of controlling the air pollution for prevention of harmful effects on health.

Need for study

On our planet the air we breathe is one of the most important things around us. All lives depend on vital natural resource. Clean and pure air is necessary at all times to sustain the life. Air is the ocean we breathe. Every creature on the earth depends upon air for its survival and for maintenance of healthy life. The air around us is highly affected by urbanization and industrialization, which have led an increase in number of vehicles for transportation of goods and people.Air quality is deteriorating especially in metropolitan cities mainly due to vehicular emissions. There is good evidence that the health of 900 million urban people over the world is deteriorating daily because of high levels of ambient air pollutants. There are different types of pollutants affecting individuals differently. Total exposure of an individual can be determined by the concentration of pollutants and the duration of exposure [6]. Air pollution is presence of substances in air at different concentrations, durations and frequencies that adversely affect human health, human welfare and or the environment. Air pollution kills people and causes human suffering through illness. According to World-Health report 2002, analyses based on Particulate matter estimates reports that ambient air pollution causes about 5 percent of trachea, bronchus and Lung cancer, 2 percent of cardio respiratory related mortality and about 1 percent of respiratory infections related mortality globally. This amounts to about 1.4 percent (0.8 million) deaths and 0.8 percent (7.9 million) of disability adjusted life years. [6] In India urban air pollution has a relatively higher impact on the urban poor than on the general population because 1.The health status is below average reducing immunity 2. Badly ventilated houses. 3. Living near pollution sources. In March 2001 Mumbai registered a population of 11.9 million people living in an area approximately 480 square kilometers which is

one of the highest population densities in the world. Two third of this population lives in slums, being so close to traffic. The high temperature humidity and lack of air conditioning forces the middle class population to keep windows open, filling their homes with traffic generated emissions [7]. A study conducted on 27 April 2006 clearly points out that the Bangalore air is worse than other metropolitan cities like Chennai and Hyderabad. The level of PM reached up to 71 microgram per cubic meter which is higher than any other southern big cities. The main cause of air pollution in Bangalore is there are 30,000 diesel auto rickshaws and number of diesel cars added each year. The result showed a rising level of Nitrogen dioxide in the air [8]. India led way world over in implementing stringent emission standards for two and three wheelers. First level of stringent standards was announced in 1996. These standards posed a big challenge to the auto manufacturing industry. Improvement in engine designs to minimize the deficiencies was at priority level. The next level of norms for India was announced in 2000 and the third level of norms applied in 2005. Direct injection is a technology that has shown the ability to greatly reduce such emissions while at the same time improving fuel economy. [5] Since 1957 auto rickshaws have become fully fledged in Indian societies and it is used for variety of purposes. Because of use of low quality 2-T lube oil, lack of preventive maintenance and fuel adulteration, auto rickshaw causes highest SPM emission (0.12 gm per kilometer) and CO emission (10 gm per kilometer). Lot of air pollution is because of three wheelers, thus it is most important to know the level of knowledge and awareness the auto rickshaw drivers have regarding air pollution, the effects of air pollution on health, the ways of various measures to prevent these adverse effects. Bagalkot city has extended areas such as Navanagar, Vidyagiri and Gaddankeri in a radius of about 15 to 20 kilometers where the private transport is mainly in the form of auto rickshaws. There are around 1200 auto rickshaws transporting people to and from Bagalkot city. Thus with magnitude of the problem in view the investigator felt the need to assess the knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention. As per investigator's knowledge no such study has been carried out in this area. So the investigator has undertaken the study to assess the knowledge regarding effects of air pollution on health and its prevention among auto rickshaw drivers of Bagalkot.

Objectives

Statement of the problem

A study to assess the knowledge regarding effects of air pollution on health and its prevention among auto rickshaw drivers of Bagalkot; with a view to develop an information booklet

Objectives of the study

To answer the research question, the investigator should identify specific research aims and objectives; i.e., the specific accomplishments the researcher hope to achieve by conducting the study. The objective includes obtaining answers to the questions or testing the research hypotheses to be achieved by conducting the research. The objectives help the researcher to avoid unnecessary details which may interfere with the study. It also helps to clearly and concisely organize the study in identifiable parts and phases.

The objectives of the study were as follows

- To assess the knowledge of auto rickshaw drivers regarding effects of air Pollution on health and its prevention.
- To find out association of the knowledge regarding effects of air pollution on health and its prevention with selected socio-demographic variables among auto rickshaw drivers.
- To develop an information booklet on effects of air pollution on health and its prevention.

Operational definitions of the terms

1. Knowledge: In this study, knowledge refers to the correct responses of auto rickshaw drivers to structured interview schedule items on effects of air pollution on health and its prevention.

2. Air pollution: In this study air, pollution refers to the degradation of air quality resulting from harmful chemicals emitted in air by auto rickshaws and other Automobiles.

3. Health: In this study, health is a state of complete physical mental and social wellbeing and not merely an absence of disease or infirmity.

4. Auto rickshaw drivers: In this study auto, rickshaw drivers are the persons who are driving the three-wheeler vehicles used for private transport in Bagalkot.

5. Prevention: In this study, prevention refers to all the action taken by the auto rickshaw drivers to avoid air pollution caused by auto rickshaw.

6. Effects: In this study, effects are harmful changes brought in health of human beings by air pollution caused by auto rickshaw.

7. Information booklet: In this study information, booklet is an educational material developed by the researcher furnishing information regarding effects of air pollution on health and its prevention.

Assumptions

- The auto rickshaw drivers have some knowledge regarding the effects of air pollution on health and its prevention.
- The study will be helpful in prevention of air pollution in Bagalkot.

Hypothesis

H1: More than 50 per cent of auto rickshaw drivers will have high knowledge regarding effects of air pollution on health and its prevention.

H2: There will be a significant relationship between knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention and their selected socio-demographic variables, at 0.05 level of significance.

Projected outcome

The findings of the study will help the auto rickshaw drivers to understand the effects of air pollution on health and its prevention.

Delimitations

The study is delimited to the auto rickshaw drivers working in Bagalkot.

Research methodology

The methodology of research indicates the general pattern of organizing the procedure of gathering valid reliable data and its analysis for the problem under investigation. Research Methods refer to steps, procedures and strategies for gathering and analyzing data in a research involved. Research methodology is a way to systematically solve the research problem. It is a science of studying how research is done scientifically. This chapter deals with the brief description of the different steps undertaken by the investigator for the study. It includes the research approach, research design, and variables, setting of the study, population, sample and sampling techniques, development of tool, description of tool, validity, pilot study, data collection procedure and plan for data analysis.

Research approach

A research approach tells the researcher what data to collect, and how to analyze it. It also suggests possible conclusions to be drawn from the data. In view of the nature of the problem under study, descriptive survey approach was considered as appropriate to describe the knowledge of the auto rickshaw drivers regarding effects of air pollution on health and its prevention. Descriptive research is non-experimental research designed to discover new meaning and to provide new knowledge where there is little known about the phenomena of interest. It is simple and more specific than an exploratory study. A descriptive research aims at identifying the various characteristics of a community or institutions or problems under study, but it does not deal with testing proposition or hypothesis, but it can reveal potential-relationship between variables.55

Research design

Research design is concerned with the overall framework for conducting the study. Research design is a blue print for conducting a study that maximizes control over factors that could interfere with the validity of the findings. Research design is an arrangement of conditions for collection and analysis of data in a manner that aims to continue relevance to the research purpose with economy in procedure. The research design selected for the study is descriptive survey design. The study was carried out for providing an accurate portrayal of auto rickshaw drivers' knowledge, regarding effects of air pollution on health and its prevention.

Variables
Variables are the qualities, properties or characteristics of persons, things or situations that change or vary.
Two variables studied in this study are
- Dependent variable.
- Socio-demographic variable.

Dependent variable: It is the outcome variable of interest. The variable that is hypothesized to depend on or be caused by other variables. In this study, the dependable variable was knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention.

Socio-demographic variables: In this study, the Socio-demographic variables are Age, Educational status, Duration of work, Years of experience as auto rickshaw driver, Type of Auto-Rickshaw, Income per month, Sources of information regarding health.

Setting of the study

The physical location and conditions in which data collection takes place in the study is known as setting. The study was conducted at Basweshwar circle auto stand, Karnataka state road transport corporation bus stand auto stand, Ambedkar circle auto stand, Kerudi Hospital auto stand, Daddanawar Hospital auto stand, Old Hanuman mandir auto stand, Old post office auto stand, Shantinagar auto stand, in Bagalkot city and Navanagar which is an extended area of Bagalkot.

Population: Population includes all possible elements that share the characteristic of researcher's interest. In this study, the Universal population was auto rickshaw drivers of Bagalkot District and the Accessible population was auto rickshaw drivers of Bagalkot city.

Sample: Sample is a small portion of the population selected for observation and analysis. The sample for the present study comprised 100 auto rickshaw drivers.

Sampling technique

Sampling is the process of selecting a portion of the population to represent it. Sampling technique is the procedure, which researcher adopts in selecting the samples for the study. For the present study convenient non random sampling technique was used to select the sample.

Criteria for selecting the sample

The sample selection was based on the following inclusion and exclusion criteria.

Inclusion criteria
The study includes the auto rickshaw drivers who were
- Willing to participate in the study.
- Available at the time of data collection.

Exclusion criteria
The study excludes the auto rickshaw drivers, who were

- sick and cannot provide data
- not able to understand Kannada or English.

Instrument used for the study
An instrument selected in a research is the vehicle that would best obtain relevant data for drawing conclusions, which were pertinent to the study. (Treece and Treece 1982).Based on the objectives of the study, a structured interview schedule was prepared in order to assess the knowledge of the auto rickshaw drivers regarding effects of air pollution on health and its prevention.

Development of tool
The steps followed in preparing tool were
- Review of literature
- Preparation of blue print.
- Consultation with experts.

The blue print
A blue print was prepared to construct the tool. It consisted 42 items on following content areas; air pollution in general, effects of air pollution on health, prevention of air pollution and prevention of effects of air pollution.

Description of the tool
The structured interview schedule has 3 sections
Section A : consist of items to collect data regarding Socio-demographic variables like age, educational status, years of experience, duration of work per day, monthly income, sources of information regarding health, type of auto rickshaw and PUC test of auto rickshaw
Section B: Consist of knowledge related questions on air pollution in general and effects of air pollution on health.
Section C: Consist of knowledge related questions on prevention of air pollution and prevention of effects of air pollution on health.

Scoring
The structured interview schedule consisted of 42 multiple-choice questions with 4 options for each item, of which one is correct and remaining three incorrect distracters. Those who place a tick mark ($\sqrt{}$) against the correct answer were considered to be right and were given the score "one" and those who placed a tick mark ($\sqrt{}$) against wrong answers were given "Zero score". The maximum score was 42.

Testing of the instrument

a. Content validity: It is the assessment of instrument ability to measure what it is supposed to measure, the degree to which the data collection tool reflects the body of knowledge pertaining to the concept being studied. The tool was validated by 6 experts from the field of Community Health Nursing and Community Medicine. They were requested to review and verify the items for adequacy, clarity, and meaningfulness. Some modifications of the items were made on the basis of suggestions and comments given by the experts.

b. Reliability of the tool: The reliability is the degree of consistency or accuracy with which an instrument measures an attribute it is supposed to measure. The tool was administered to ten auto rickshaw drivers. The reliability of the tool is computed by using split half technique. The correlation analysis was done by Karl Pearson coefficient correlation. The coefficient of correlation for reliability was found to be r =0.86, suggesting the tool is highly reliable.

Pilot study

It refers to the preliminary research conducted to test elements of the design before an actual full scale study begins. The pilot study was carried out on 10 auto rickshaw drivers from Gaddankeri-cross auto stand. The purpose of the pilot study was to assess the feasibility of the study, appropriateness of the tool, and decide the plan for statistical analysis. During the pilot study the investigator did not face any problems and found the study to be feasible.

Procedure for data collection

Prior permission was obtained from the Regional Transport Officer, Bagalkot and from District Health Officer, Bagalkot. The investigator introduced him to the auto rickshaw drivers. The investigator to the auto rickshaw drivers briefly explained the purpose of the study. The data was collected at auto rickshaw stands. The tool was administered to the auto rickshaw drivers and each one took about 20-30 minutes to complete the structured interview schedule.

Plan for data analysis

Analysis is the systematic organization and synthesis of research data and the testing of the research hypothesis using that data. The data was analysed using descriptive and inferential statistics. The data was presented under the following sections

Section I: Description of socio-demographic variables.

Section II: Analysis of knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention. A- Level of knowledge of auto rickshaw drivers'- Mean, Std. Dev, mean percentage of knowledge scores of auto rickshaw drivers in various different aspects- Item wise percentage of correct responses of auto rickshaw drivers regarding effects of air pollution on health and its prevention.

Section III: Association between level of knowledge regarding effects of air pollution on health and its prevention and the socio-demographic variables.

Summary: This chapter describes the research methodology adopted for the study. It included research approach, research design, sample and sampling technique, research setting and study instruments. This study had adopted descriptive research approach. The dependent variable was knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention.

The study was conducted with a sample size of 100. Convenient non random sampling technique was used. The tool used for the study was structured interview schedule along with preformed for selected personal information. The data was planned to be analyzed in terms of both descriptive and inferential statistics.

4. Discussion

There is clear evidence that air pollution give rise to adverse effects on human health. Vehicle traffic greatly contributes to the overall impact of outdoor air pollution. Traffic emissions are associated with morbidly (illness)

and mortality (early death) and hence to be very significant urban health concern.

The present study was designed to assess the knowledge regarding effects of air pollution on health and its prevention among auto rickshaw drivers of Bagalkot city; with a view to develop an information booklet. The data findings have been organized and discussed based on the study objectives. Description of socio-demographic variables.

The findings of the present study revealed that the majority of the study subjects 36 (36%) were in the age group of 25-32 years and 6 percent were in the age group of 39 years and above. It is supported by study conducted by Government of Bangladesh and the result showed that (35%) auto rickshaw drivers were in age group of 25-30 years and 3 percent were in age group of 45-50. It looks like as they grow in age they can no longer do the arduous job of driving long hours and quit the vocation.

The educational status revealed that the majority of the study subjects 40 (40%) had secondary education and 7% had no formal education. It is supported by similar study conducted by Government of Bangladesh and found that 73% of the study subjects had no formal education and only 14% were literate giving conclusion the educational level of study subjects was found to be very poor.

The years of experience wise distribution the majority 48 (48%) had 5-10 years of experience and 4 (4%) of study subjects had 15 years and above experience.
The distribution of study subjects by monthly income 42 (42%) of study subjects earn between Rs 2001-3000 and 7% earn between Rs 4000 –and above.

The distribution of study subjects by sources of information regarding health. Majority of the study subjects 41 (41%) had information regarding health through Radio and Television and 4% has information through internet.

The majority 79 (79%) of the study subjects used petrol auto rickshaw and 21% used diesel auto rickshaws. CNG and LPG auto rickshaws were not found. The majority of the study subjects 66 (66%) had PUC test for their auto rickshaw and 34% not done PUC test. Level of knowledge of auto rickshaw drivers: Majority of the study subjects 53 (53%) had medium knowledge, 1 % had adequate knowledge and 46 % had inadequate knowledge. Mean, standard deviation, mean percentage of knowledge scores of auto rickshaw drivers in various aspects of effects of air pollution on health and its prevention.

The total mean score was 15.33 and means percentage was 36.50 % with total and standard deviation 5.30. Area wise mean percentage of knowledge score was 29.83 % in the area of knowledge regarding air pollution in general with mean score 1.79 and standard deviation 1.12. In the area of knowledge regarding effects of air pollution on health the mean percentage of knowledge score was 42.07 with mean score 5.89 and standard deviation 2.34. Area wise mean percentage of knowledge score regarding prevention of air pollution was total 38.50 percent with mean score 4.62 and standard deviation 2.13.

In the area of knowledge regarding prevention of effects of air pollution on health the mean percentage was 41.10 percent with mean score 4.11 and standard deviation 9.81.The finding revealed that the subjects had more knowledge regarding effects of air pollution on health (with mean percentage 42.07) in other areas mean percentage of knowledge score was more or less similar. Item wise percentage of correct response of auto rickshaw drivers regarding effects of air pollution on heath and its prevention. The highest percentage (67 %) of auto rickshaw drivers responded correctly to item "The commonest disease caused by traffic related air pollution in children is Asthma."

The least percentage (16 %) of auto rickshaw drivers responded correctly to the item "Inefficient combustion (burning of fuel in vehicle to produce energy) which result in excessive production of smoke is caused by obstructed air filter".

Association between the knowledge of auto rickshaw drivers with selected socio-demographic variables. Findings revealed that there was a significant association between knowledge of auto rickshaw drivers and socio-demographic variable such as "Duration of work hours" ($\chi 2 = 6.81$), and "Sources of information regarding health" ($\chi 2= 9.15$). And no significant association was found between other variables.

Thus the hypothesis H2
There will be a significant relationship between knowledge of auto rickshaw drivers regarding effects of air pollution on health and its prevention and their selected socio-demographic variables, at 0.05 level of significance is accepted.

Conclusion

The study conclusions are the researcher's attempt to show what knowledge the researcher has gained during the study and an attempt to generalize the finding. The focus of this study was to assess the knowledge regarding effects of air pollution on health and its prevention among auto rickshaw drivers of Bagalkot; with a view to develop an information booklet. The conclusions drawn from the study are as follows: Majority of auto rickshaw drivers were willingly participated in the study. The auto rickshaw drivers had some knowledge about effects of air pollution on health and prevention. They gave free and frank responses regarding effects of air pollution on health and prevention of air pollution. The green fuel like LPG and CNG is not available in Bagalkot and not any auto rickshaw has been converted in to CNG or LPG.

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