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A CASE STUDY ON AIR POLLUTION AND ITS IMPACT ON HUMAN HEALTH IN GREATER CHENNAI

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Abstract

Air pollution has significant effects on exacerbation of asthma, allergy and other respiratory diseases. Like many other mega cities in the world the ambient air quality of Chennai is also being deteriorated day by day. Automobile exhausts and certain industrial pollutants produce O₃ by photochemical reactions. The particulate matter, particularly less than 10 μ in size, can pass through the natural protective mechanism of human respiratory system and plays an important role in genesis and augmentation of allergic disorders. Sources of air pollution in the area and the unique problem arising out of the emission from the vehicles, industries, etc. have been described. A major study was Anna Nagar, Adyar, Kilpauk, T. Nagar and Vallalar Nagar. The main objective is to study the adverse health effects of exposure to ambient air pollution in different areas of Chennai city and examines the patterns of total number of Vehicles in Chennai city. The analysis results the relationship between the levels of air pollution and the percentage of affected people in selected area of Chennai city. This paper tries to assess the air quality and human health due to air pollution loads and human health impacts on major road networks of Greater Chennai.

Keywords: Pollution; Transport; Vehicle emission; Air quality; Human Health

Introduction

In this paper is to look at the analysis of pollution emitted by the vehicles in the Chennai city, the data have been collected from TNPCB Chennai. The analysis was conducted once in three years for five sample locations to measure the ambient air quality in Chennai city. The sample locations were Anna Nagar, Adyar, Kilpauk, T. Nagar, Vallalar Nagar. The major pollutants are SO₂, NO₂, SPM. T. Nagar, Anna Nagar, Kilpauk, Vallalar Nagar and Adyar the ward located in the Chennai city. This case study Two for a resident

area (Adyar, Anna Nagar) and other two is Commercial area (T. Nagar, Kilpauk). One for industrial area (Vallalar Nagar) This study analyses the existing types of vehicle, main sources vehicular air pollution, purposes of travels and health factor in this case study. The questioner survey 20 sampled in the five area. Richu Rai et al (2011) examined the air pollutants pose risks on yield of crops depending on the emission pattern, atmospheric transport and leaf uptake and on the plant's biochemical defence capacity. Rajesh Kumar (2009) the study focuses to find out reason for work stress and suggestions

to reduce work stress for traffic police. Myoung-Young PIOR et al (1997) papers studied establish an "Air Pollution Assessment Applying GIS Integrated System" for providing more accurate information about air pollution. Marie S. O'Neill et al (2003) the present researched by introducing readers to methodological and conceptual approaches in the fields of air pollution and social epidemiology; by proposing theories and hypotheses about how air pollution and socioeconomic factors may interact to influence health, drawing on studies conducted world? wide; by discussing methodological issues in the design and analysis of studied to determine whether health effects of exposure to ambient air pollution are modified by SEP; and by proposing specific steps that will advance knowledge in this field, fill information gaps, and apply research results to improve public health in collaboration with affected communities.

Chennai is one of the major metropolitan centres and the fourth largest in India. It lies between $12^{\circ} 9' N$ to $13^{\circ} 9' N$ latitudes and $80^{\circ} 12' E$ to $80^{\circ} 19' E$ longitudes and covers a total area of 1189 km.² Chennai city consists of 15 Corporation Zones and 200 Wards. The city of Chennai is a typical one falling under this category being ranked as the fourth largest metropolitan city in India with a population of 9 million (Census 2011).

The collected information has been analyzed using appropriate computer assisted and analytical procedures using Statistical Package for Social sciences (SPSS) and ArcGIS. Comprehensive evaluation has been carried out in order to study the atmospheric pollution in the region, monitor the air pollution index with statistical analysis. The area selected for the study is the Chennai city

Growth in Vehicle Population in Chennai City

Chennai vehicle population has been accelerating steadily from 600,000 in 1992, to 1.3 million in 2001 and 3.64 million in 2012. Daily, about 1500 new vehicles hit the roads, with two-wheelers constituting more than 75 percent of them. However, registration of new cars is also on the rise. Chennai vehicles constitute one-fourth of the 17.5 million vehicles across the state of Tamil Nadu. The state has more two-wheelers (13 million). Two-wheeler account for 78 percent of all vehicles in the state, while cars add up to 14 percent. Accounting to a survey conducted by the city traffic police in 2012. More than 70 percent of the population should be using public transport, but less than 40 percent regularly use it.

Chennai city is more than 70 percent of the population should be using public transport, but less than 40 percent regularly use it. Owing to the high traffic density, the average bus speed in the city as of 2014 is 17-18 kilometres per hour. Over the next five years it is expected to come down to 12 km per hour, whereas the maximum allowable operating speed of the vehicles shall be 80 km ph. with a maximum design speed of 90 km ph.

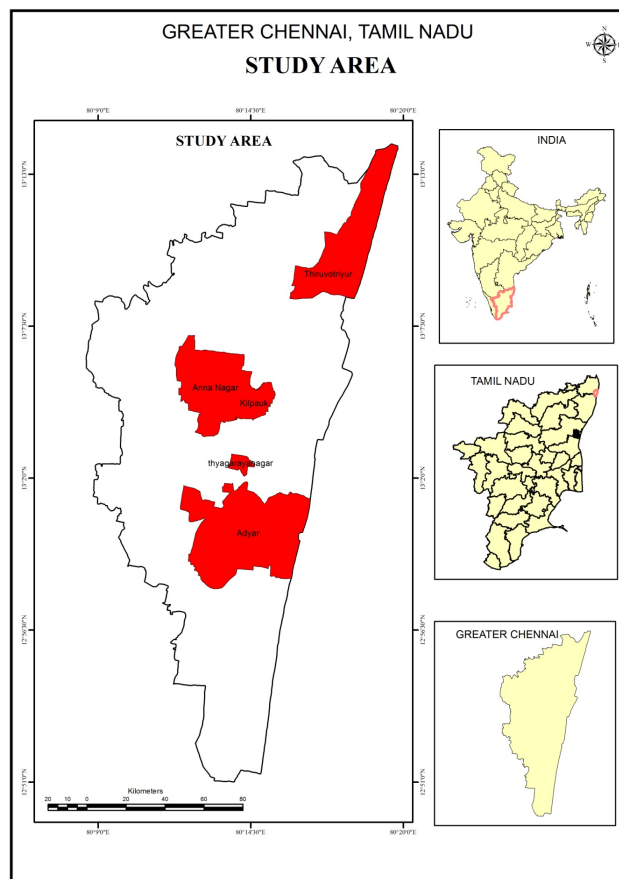


Fig. 1. Study area map

Table 1. Vehicler Growths i n Chennai City – 2011-2015

Year	Transport Vehicles	Non- Transport Vehicles	Total
2011	188849	3185716	3374565
2012	209473	3473128	3682601
2013	208714	3673136	3881850
2014	229266	4028107	4257373
2015	234588	4209490	4444078

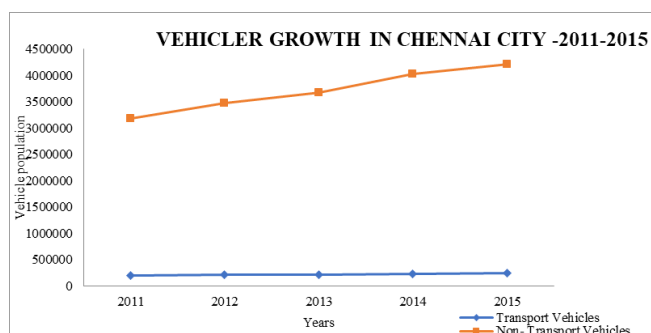


Fig. 2. Vehicle growth in Chennai city – 2011-2015

The Chennai Metro Rail project is expected to reduce the commuting time by 75 percent from one end of the city to another. Comparatively the registered vehicular population has increased more than two folds during the year 2011 to 2015.

Analysis and Interpretation

Correlation Matrix (Positive, Negative Variables with Transport, Pollution and Health)

Association between Transport, Pollution and Health Variable

The association between the type of transport, pollution and Health variables is brought out by applying correlation techniques and the result is presented in Table No: 2 from the analysis of the correlation coefficient value of transport, pollution and health variables, the following associations were identified. The transport variables like type of vehicles, travel Daily base, Purpose of travel. The type of vehicles rate is positively associated with the variable. Air pollution affects health and air pollution Diseases have a positive relationship with a transport variable. The negative associated variables namely travel daily base, purpose of travel; source of air pollution, air pollution affected and health have a relationship with transport variables. As for as travel daily base its connected variables like source of air pollution, air pollution affected and air pollution affected in health, air pollution diseases and health have a relationship with positive correlation matrix. The negative association variables namely type of vehicles only positively correlation exists between purposes of travels variables like sources of air pollution and air pollution diseases. The negative relationship indicates that the variables like types of vehicles, travel in daily base, air pollution affected, air pollution affected health and health.

Association between Pollution

The Table 2 represents positive and negative associated variables names pollution. It may be seen from the table that among variables travel daily base and purpose of travel have a positive correlation the negative correlation like type of vehicles, air pollution affected, air pollution affected in health, air pollution diseases and health. Among the variables travels daily base, air pollution affected health, air pollution diseases and health have a significant positive association with the correlation except the above other variables shown a negative correlation.

Association between Health

The variables namely type of vehicles, travel daily base, air pollution affected, air pollution diseases and health. Out of these variables are positive associated only two variables like purpose of travel, source of air pollution has shown a significant associated with negative variables. The air pollution diseases are positively associated with the variable like type of vehicle, travel daily base, purpose of travel, air pollution affected, air pollution affected in health, health. The negative correlation variables like sources of air pollution. The variables namely travel daily base, air pollution affected, air pollution affected health and air pollution diseases have a positive relationship with the health all the variable have shown a negative associated with health.

Impact of Air Pollution on the Health Study

T. Nagar, Anna Nagar, Kilpauk, Vallalar Nagar and Adyar the ward located in the Chennai city. This case study Two for a resident area (Adyar, Anna Nagar) and other two is Commercial area (T. Nagar, Kilpauk). One for industrial area (Vallalar Nagar) This study analyses the existing types of vehicle, main sources vehicular air pollution, purposes of travels and health factor in this case study. The questioner survey 20 sampled in the Five area. Sources of vehicular Air pollution Two-wheeler, Bus, Car, auto, in the main sources of Air pollution in Adyar, Kilpauk, Anna Nagar, Vallalar Nagar and T. Nagar. The work and college of main purpose of travel by both areas.

Health Factor

From observations and information from the T. Nagar and Adyar respondents, careful list of diseases affected in health factor has been prepared. Among the T. Nagar 25 percent and Adyar 30 percent, Kilpauk 25 percent, Vallalar Nagar 35 percent, Anna Nagar 20 percent responded in all health factors. Proportion of the responded in all Eye problems, cough, running nose, sneezing, 65% of T. Nagar and 55% of in Adyar, Anna Nagar of 70 percent, Kilpauk of 55 percent, Vallalar Nagar 30 percent, 5% of response skin allergy and neck pain in the both areas. 10% of response no health affected in Adyar.

Table 2. Correlation Matrix

Category and Variables	Type of transport, Air pollution and Health Variables	
	Positive Correlation (+)	Negative Correlation (-)
1. Transport		
i) Types of vehicles	1.Air pollution affected health (137.087) 2.Air pollution Diseases (095.174)	1.Travel daily base (103.153) 2.Purpose of travel (087.194) 3.Sources of Air pollution (072.237) 4.Air pollution affected (014.444) 5.Health (110.137)
ii) Travel Daily Base	1.sources of air pollution (063.266) 2.Air pollution affected in health (127.104) 3.Air pollution diseases (057.285) 4.Health (075.228)	1.Type of vehicle (103.153)
iii) Purpose of Travel	1.Source of air pollution (108.143) 2.Air pollution diseases (006.474)	1. Type of vehicles (087.194) 2.Travel daily base (050.311) 3. Air pollution (096.171) 4.airpollution affected (193.027) 5. Health (001.494)
2. POLLUTION		
i) Sources of air pollution	1.travel daily base (132.095) 2.Purpose of travel (108.143)	1.Type of vehicles (072.237) 2.Air pollution affects (013.448) 3.air pollution affect health (186.032) 4.Air pollution Diseases (196.025) 5.Health (145.075)
ii) Air pollution Affect	1.Travel daily base (111.136) 2.Air pollution affected health (312.001) 3.Air pollution Disease (648.000) 4.Health (222.013)	1.Types of vehicle (014.444) 2.Purpose of travel (096.400) 3. Sources of air pollution (013.448)
3. HEALTH		
i) Air pollution affected health	1.Type of vehicles (137.087) 2.Travel daily base (127.104) 3.Air pollution affect (312.001) 4.Air pollution Diseases (648.000) 4.Health (248.006)	1.Purpose of travel (193.027) 2.Source of air pollution (186.032)
ii) Air pollution Diseases	1.Type of vehicle (095.174) 2.travel daily base (021.417) 3.Air pollution affect (251.006) 4.Air pollution affect health (648.000) 5.Health (141.081)	1.Source of Air pollution (196.025)
iii) Health	1.Travel daily base (075.228) 2.Air pollution affect (222.013) 3.Air pollution affect health (248.006) 4.Air pollution Diseases (141.081)	1.Type of vehicles (110.137) 2.Purpose of travel (001.494) 3. Sources of Air pollution (145.075).

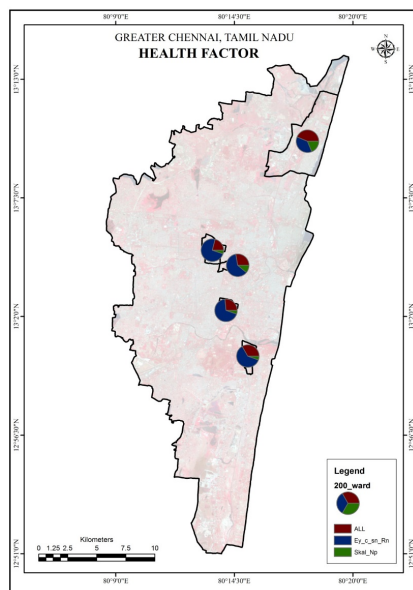

Fig. 3. Health Factor

Table 3. Health Factor

Types of disease	T. Nagar (%)	Adyar (%)	Kil-pauk (%)	Val-lalar Nagar (%)	Anna Nagar (%)
All	25	30	25	35	20
Eye Problem, Cough, Running Nose, Sneezing	65	55	55	30	70
Skin Allergy and Neck Pain	5	5	10	15	5

Summary and Conclusion

Finally this analysis concluded very high ambient air quality in T.Nagar and Vallalar Nagar. T. Nagar area is very conjunction vehicular traffic and commercial area. The Vallalar Nagar is industrial area. The vehicular rate of increasing is highly correlated towards the vehicular growth. The respondent has been very high affected to eye problem, cough, running nose, sneezing in T. Nagar and Adyar area. ⁽¹⁻⁸⁾

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