



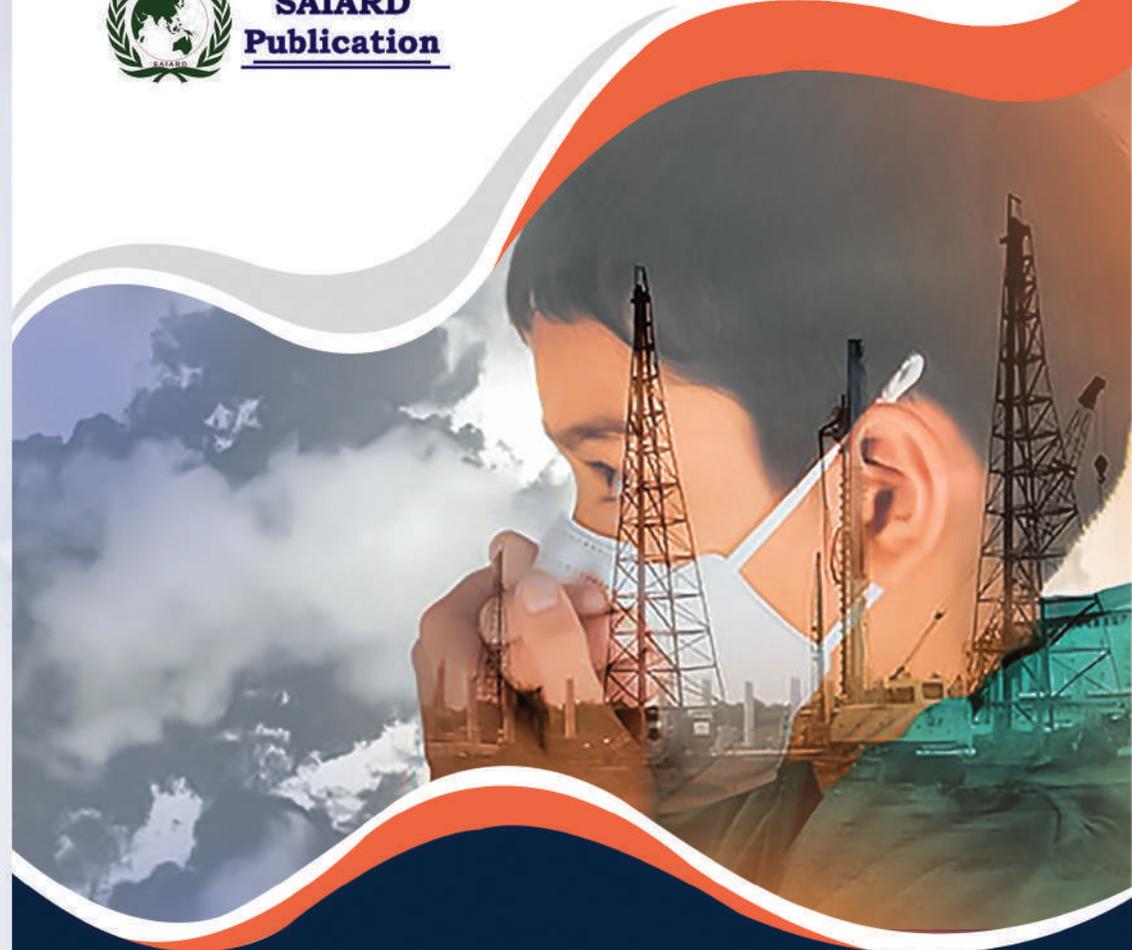
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Dr. Das' work on 'Asthma Predictability Index among the children of Atopic Parents living in and around Kolkata' had been in integral part of the 12th World Congress of the RSAI in 2018.

In addition, Dr. Das has also undertaken research in resource management and sustainable development, urbanisation and its linkage with poverty.

There are national and international publications in her credit. She has published a book on Remote Sensing for school students.

Dr. Das is also involved in social work and is an avid traveller.



ASTHMA PREDICTABILITY INDEX AMONG CHILDREN WITH ATOPIC PARENTS IN AND AROUND KOLKATA METROPOLIS AND ITS CORRELATION WITH VARIOUS AIR POLLUTION INDICES

(A Post Doctoral Thesis)

Dr. Jayati Das

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INTRODUCTION

During the last 50 years, respiratory allergic diseases have increased in children in many countries with modern living conditions. There is a large change in air pollution level related to car traffic. At adequately high concentrations, pollutants such as particulate matter, Sulphur dioxide (SO₂), car exhaust and ozone are known to be linked with respiratory symptoms. While it is well established that air pollution can activate symptoms in children with well-known asthma (1), its control on the inception of asthma and allergies is not acknowledged.

Most, but not all, paediatric epidemiological studies found a consistent but small effect of long-term exposure to car traffic or its emissions on respiratory symptoms and lung function (2, 9–14]. A huge cross-sectional study using pollutant contact calculated on a 1-km² grid in Kolkata, West Bengal found increased cough, bronchitis and nonatopic asthma, but no effect on atopic asthma and allergies (3). The relationship between allergy and traffic exposure is less consistent. However, a number of paediatric studies found no increase in allergy with measured traffic exposure (2, 9, 12, 13).

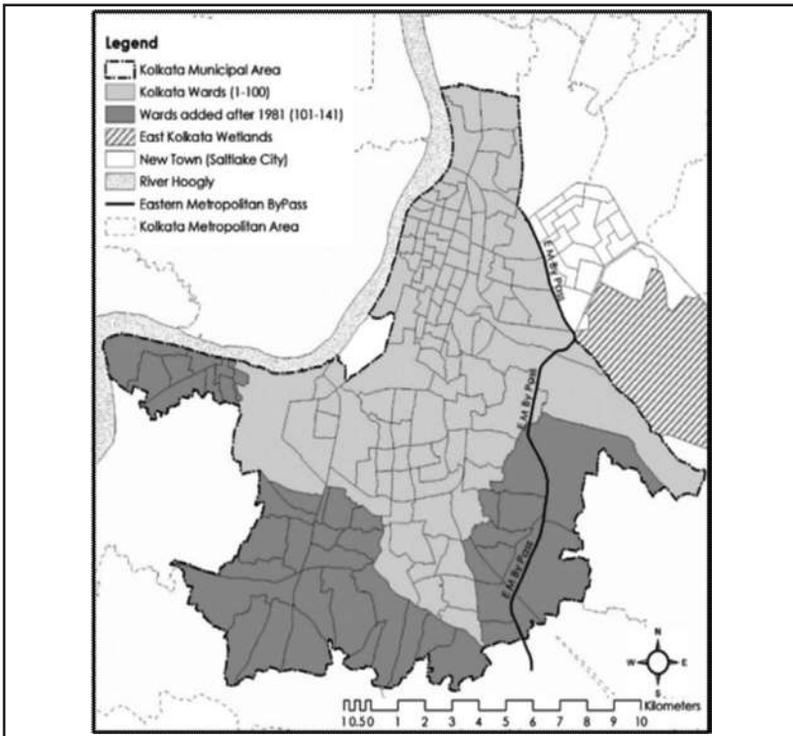
The conflicting results of the epidemiological studies are at least partly attributable to small sample sizes in some studies the difficulty of sorting out socioeconomic variables from traffic exposure, and reporting bias for self-reported traffic exposure and symptoms.

The purpose of this study is to determine the relationship between vehicle-traffic counts and estimated pollutant levels at the place of residence and reported respiratory symptoms, doctor diagnoses and measured allergic sensitisation and respiratory function in a huge random section of children with atopic parents.

Study Area

Kolkata city is the study area which is located in the eastern part of the India. It is the one of the oldest city of India. The city has a life of more than 300 years old and it was once the capital of India during the British governance until 28th December 1911 after that the capital had shifted to Delhi. The administration area of Kolkata is a combination of several government agencies and it consists of overlapping structural divisions.

KOLKATA METROPOLITAN AREA



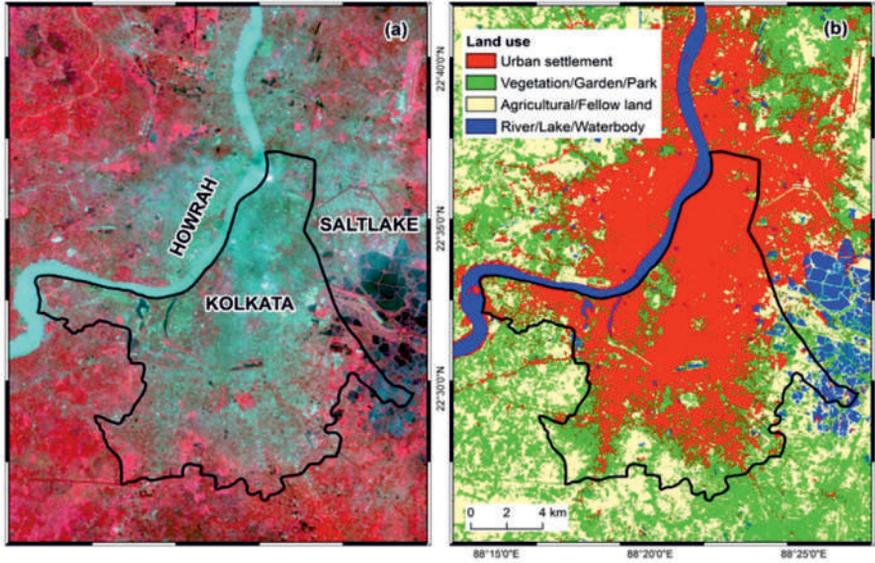
[Figure : 1]

Kolkata Metropolitan Area, also known as the *Calcutta Metropolitan Area* and *Greater Kolkata*, is the urban agglomeration of the city of Kolkata in the Indian state of West Bengal. It is the third populous metropolitan area in India after Delhi and Mumbai.

Kolkata is located in eastern part of India in the Ganges Delta at an elevation ranging between 1.5 to 9 Metres. It is spread linearly along the banks of the River Hooghly in a north-south direction. Much of the city was originally a vast wetland, reclaimed over the decades to accommodate the city's burgeoning population. The remaining wetland, known as East Calcutta Wetlands has been designated a "wetland of international importance" under the Ramsar Convention.

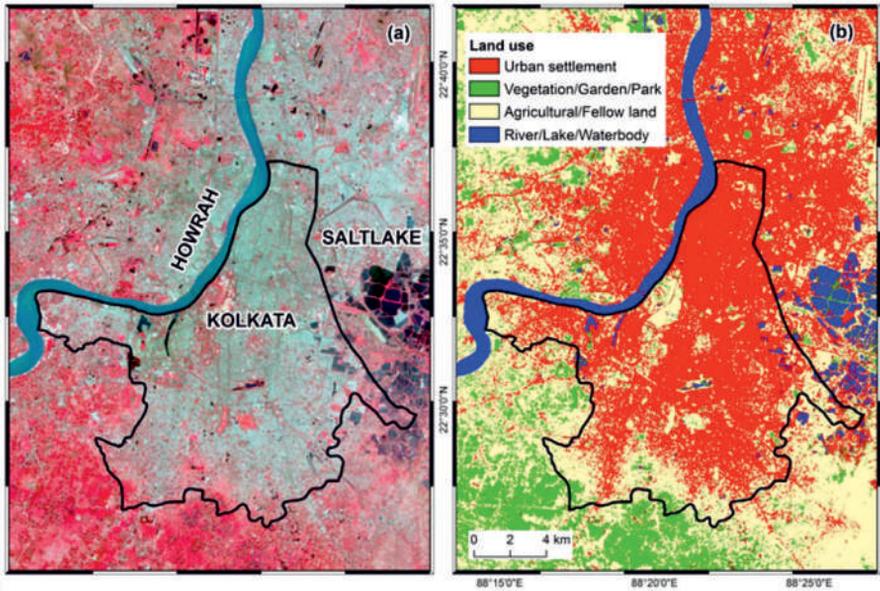
Like the most of the Indo-Gangetic plains, the predominant soil type is alluvial. Quaternary sediments consisting of clay, silt, various grades of

2002



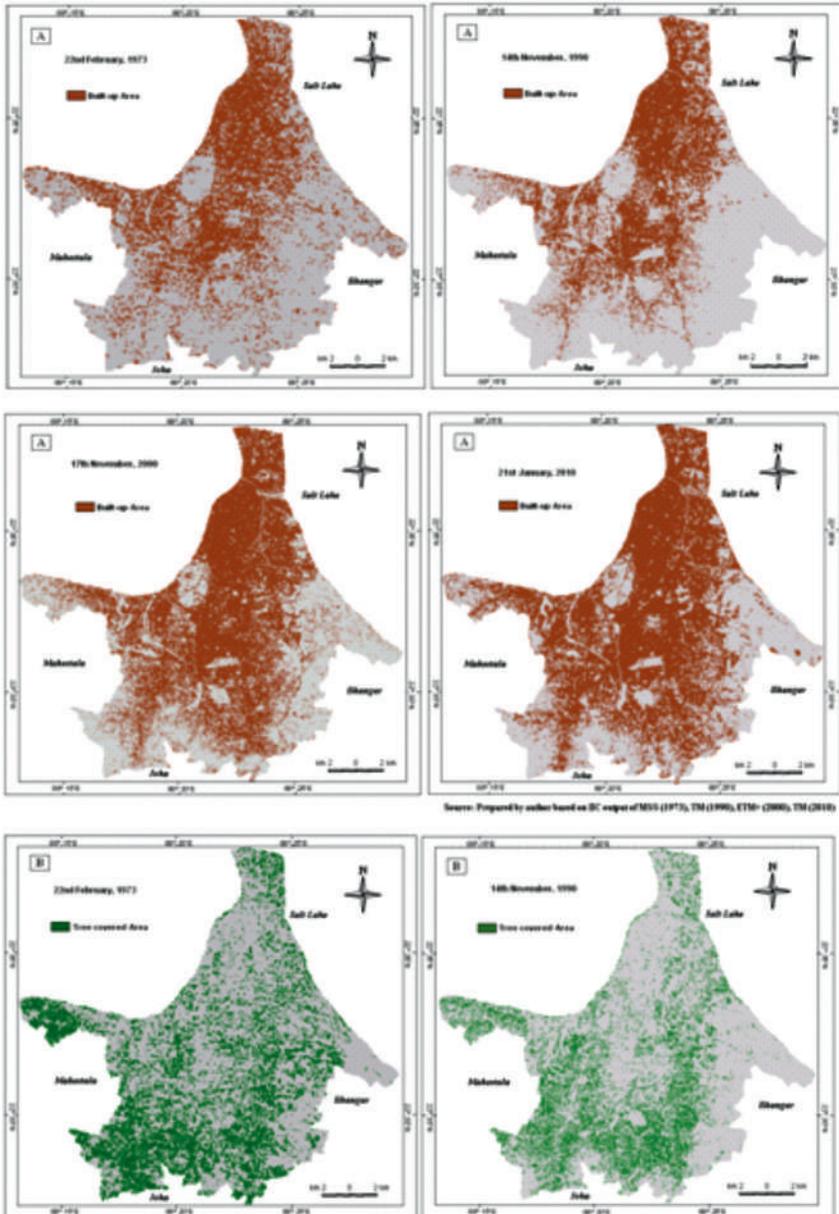
[Figure : 6]

2014

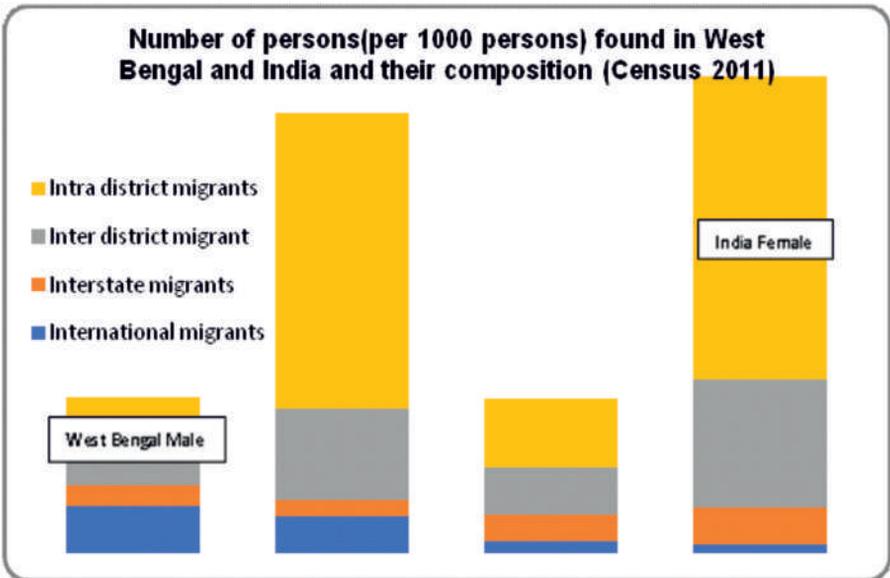


[Figure : 7]

Spatial Distribution of 'A' Built-up and 'B' Tree Covered Area (after IIC Output) in Kolkata Municipal Corporation (KMC) from 1973 to 2010

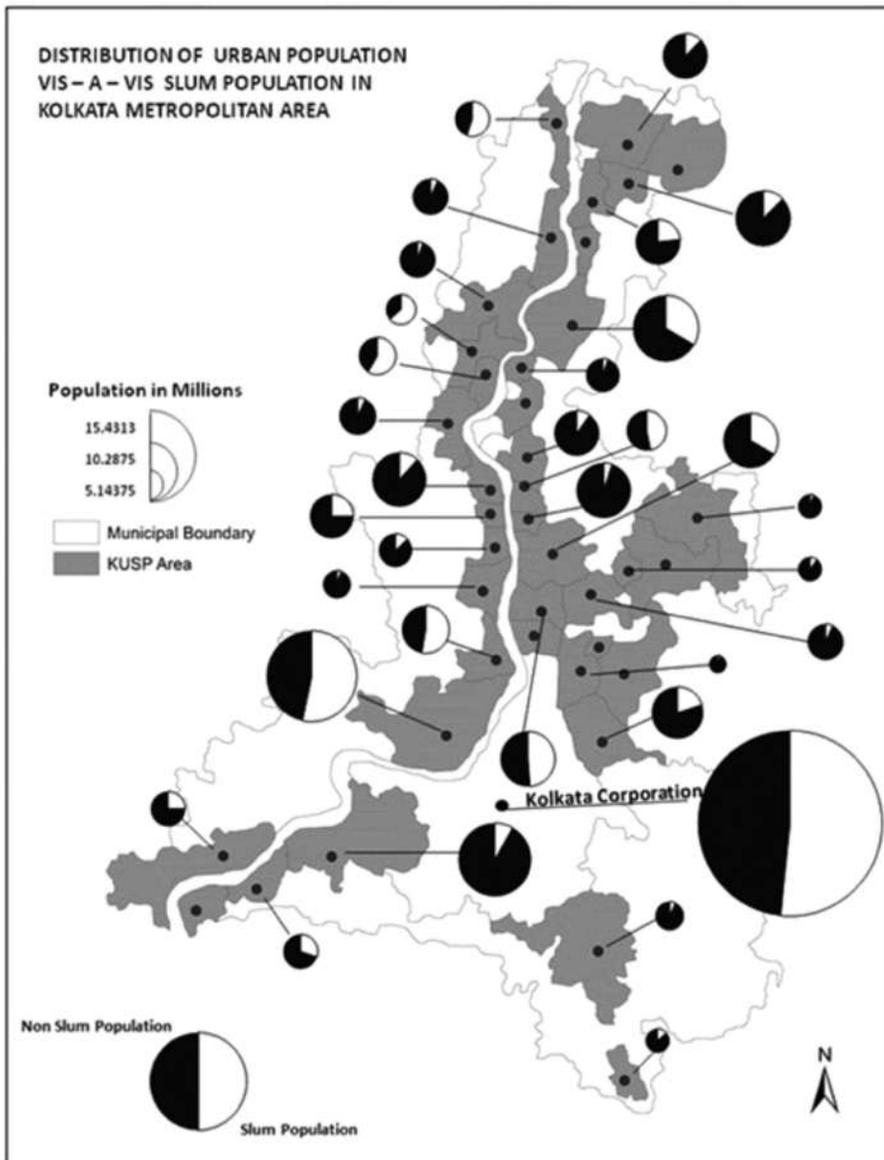


The refugees, coming from the eastern part of the erstwhile province of Bengal, spread all over West Bengal and in other parts of India. But a major concentration was in the greater Calcutta region. Most of the early refugees from east Bengal belonged to the upper or middle caste groups. They tended to gravitate towards the urban centres, more specifically to Calcutta. Almost 60 percent of the migrants up to 1949 were non-agriculturalists.² Acute housing problem forced them to erect squatter settlements on the fringes of the city. But waves of migrating people lashed on to the city and the state for the next decade. Late 1940s and the 1950s saw acute food crisis, industrial disturbances, black-market activities and political agitation in the city.



[Figure : 13]

Due to huge influx of migrants (Fig 13) streaming in from neighboring countries and scarcity of living quarters the slum population (Fig 14) is gradually increasing (10).



[Figure : 14]

stations. Kolkata has 7 automated air quality monitoring stations and 16 manual ones. The AQI in Kolkata of 343 in November 2019 (recorded at the automated air monitoring station of Fort William, Kolkata) resulted in the city falling in a very poor air quality category in 2019.

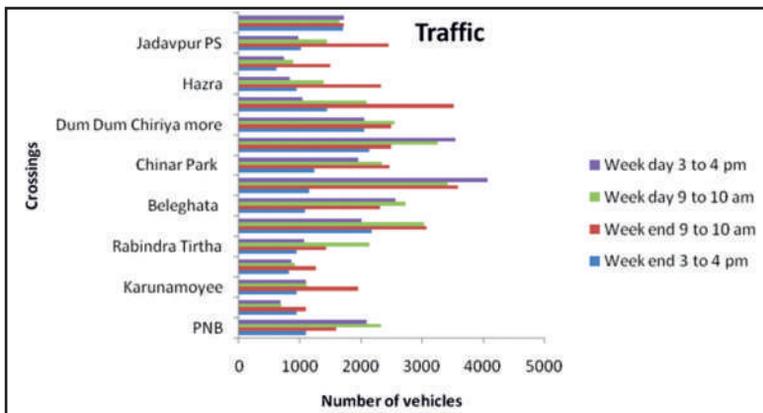
The data used in the model is primarily in three parts:

1. Data on traffic has been collected by means of primary data collection methods as traffic counts of major junctions in the city during rush hours on a weekday.
2. Data on pollutants PM₁₀ and NO₂ has been collected from the pollution control board website.
3. The health information has been collected via an online survey of young population of the metropolitan city.

Monitoring points were set up in each of the zones and monitoring was carried out for One hour at ground level. Attempts were made to observe a fixed time schedule for monitoring the traffic data (Fig 28) during the rush hours (0900 – 1000 hours and 1500 – 1600 hours).

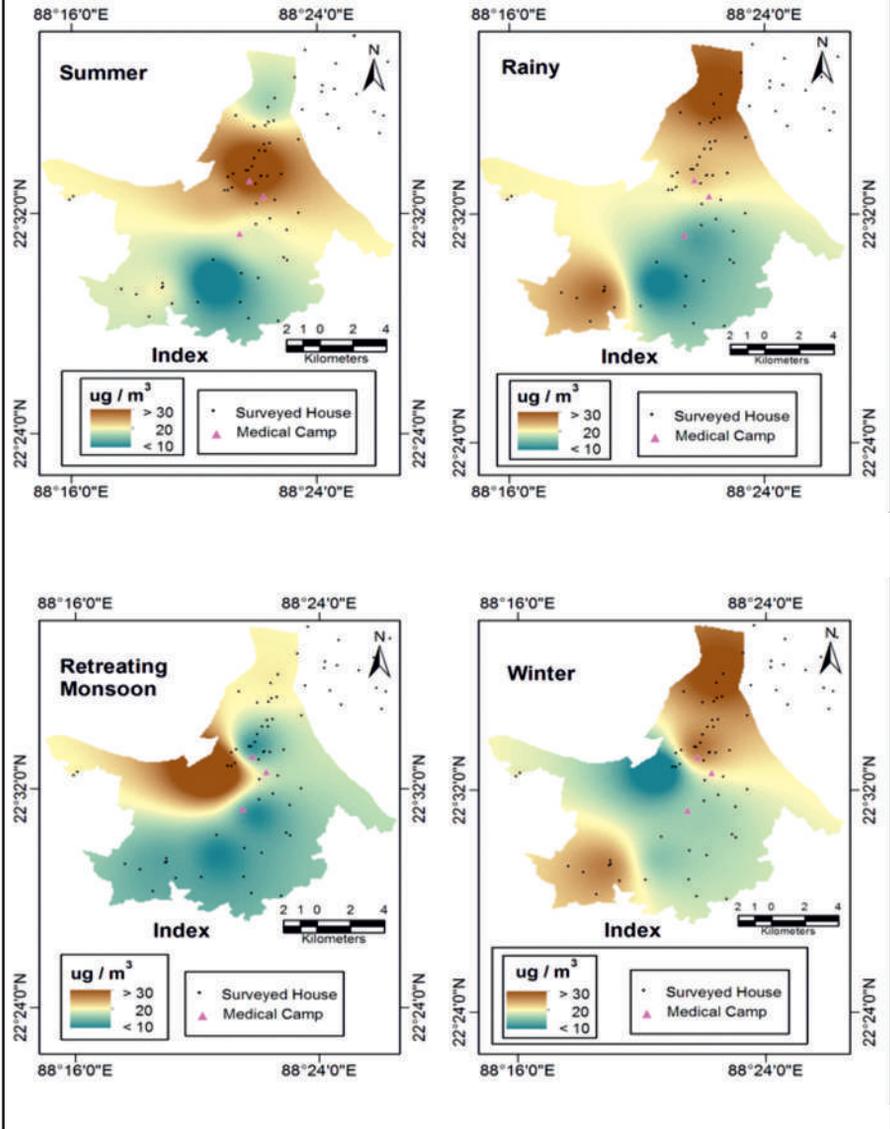
The data on pollutants was sourced from government websites as described as below.

Data on the concentration of PM₁₀ and NO₂ in the air has been obtained from the official website of West Bengal Pollution Control Board, for those specific days on which the traffic survey was carried out, to maintain consistency between the collection of traffic data and the level of pollutants in the air.



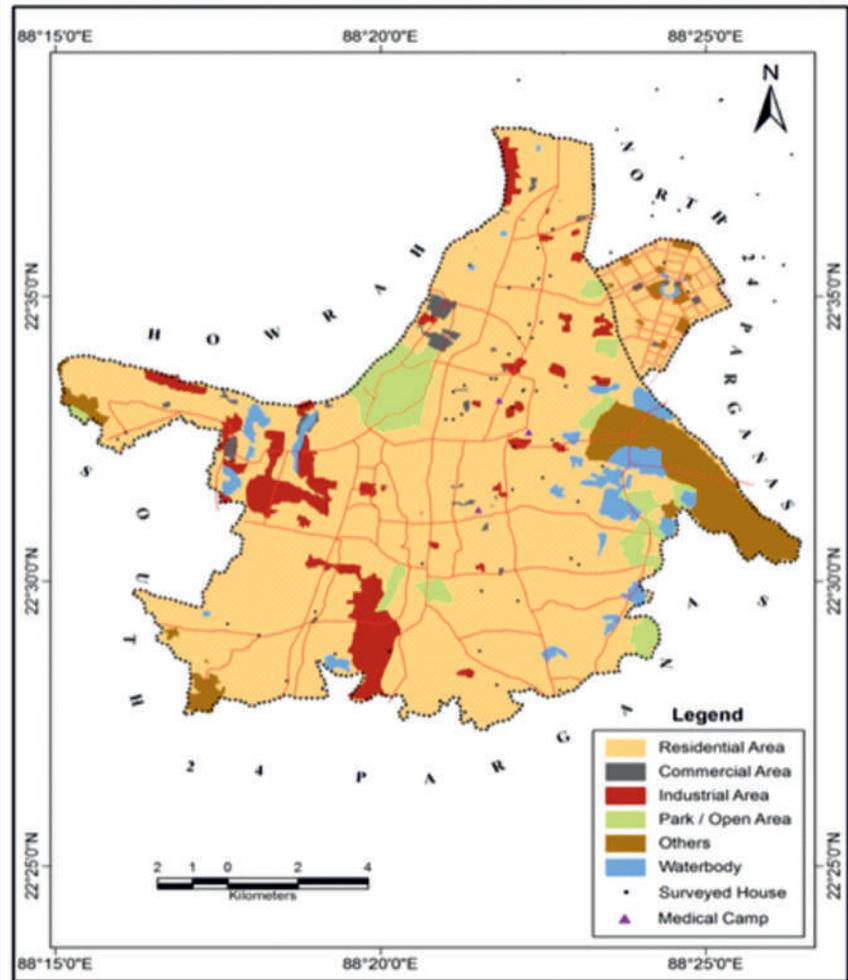
[Figure : 28]

SEASONAL VARIATION OF SO₂



[Figure : 32]

LANDUSE MAP

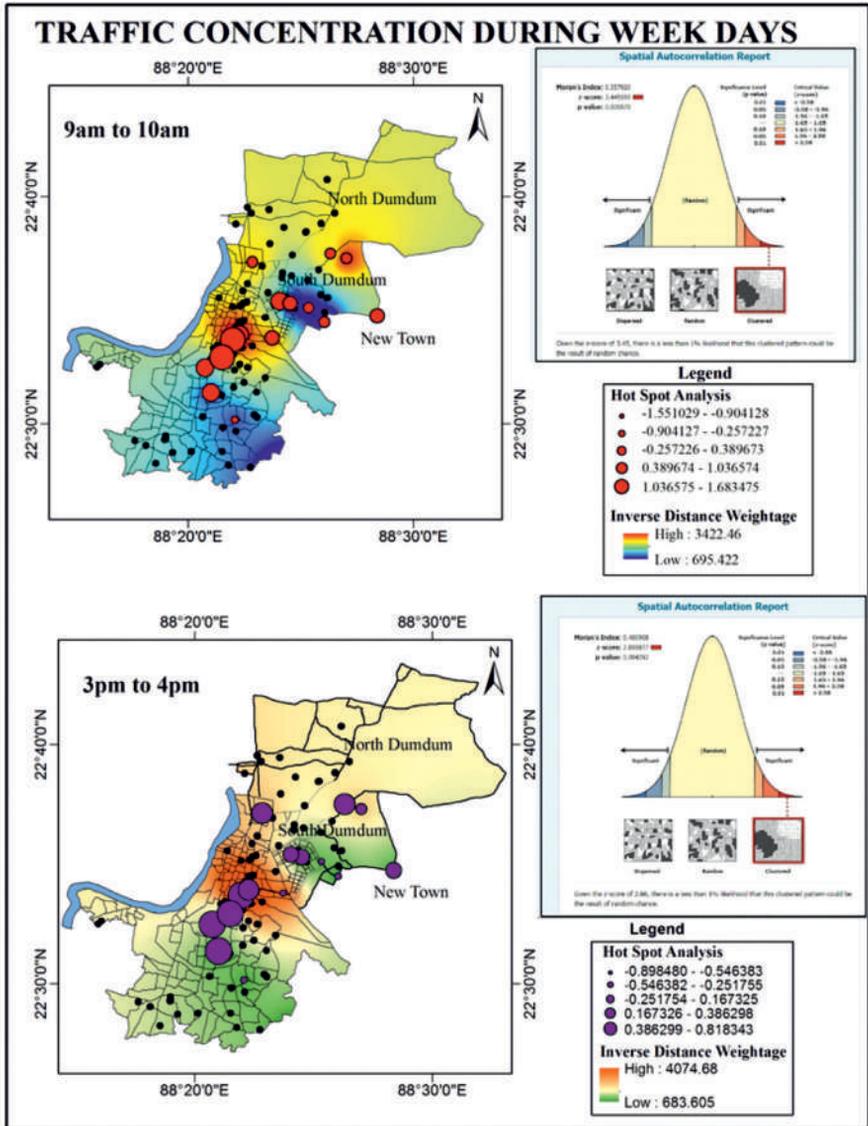


[Figure : 39]

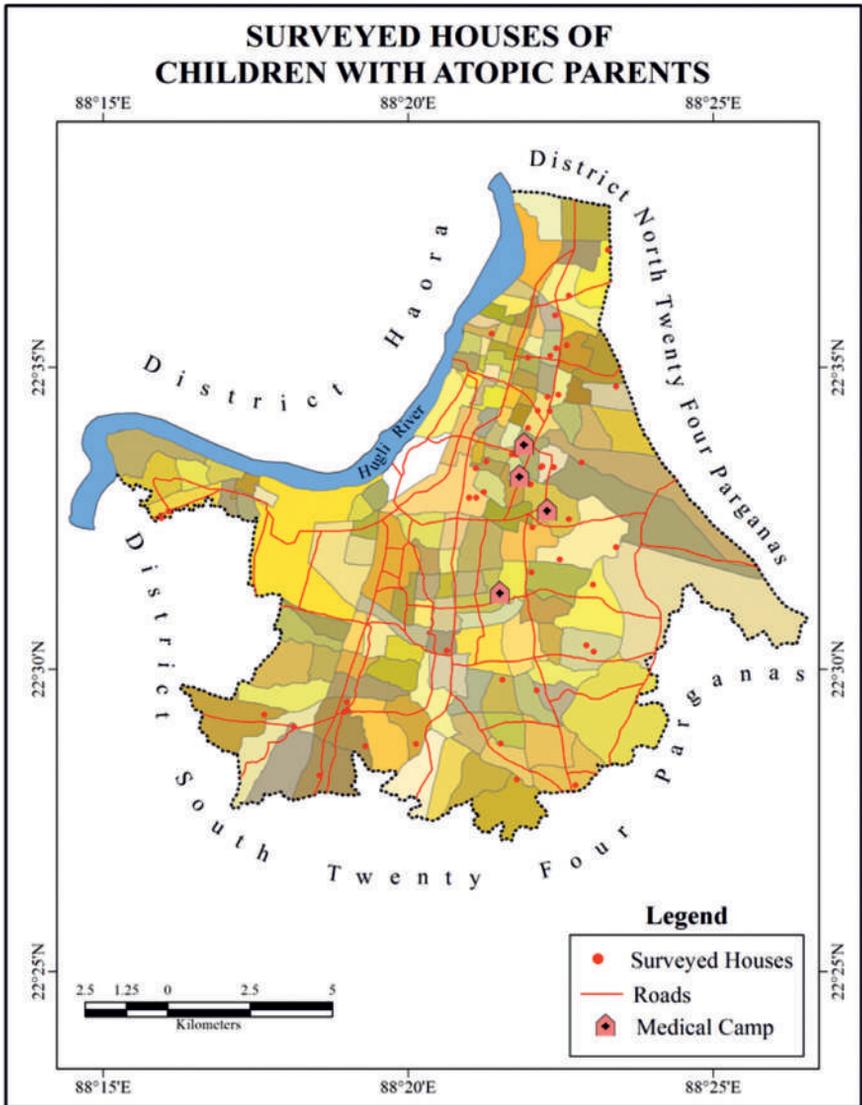
URBAN LAND STRUCTURE OF KOLKATA CITY [Table 2]

Landuse	Area in sq.km	%
Residential	659.40	37.50
Agricultural and vacant land	611.80	34.96

The independent variables were created on the GIS software MapInfo in buffers of 50, 100, 150, 250 and 500 m-radii around 12 sampling locations. The variables consisted in five broad categories:



[Figure : 42]



[Figure : 52]

Each participant's school and home addresses were geocoded(Fig 52), and distances from major roadways were measured to calculate a composite measure accounting for both home and school traffic exposure.