

Study of Vehicular Noise Pollution in Lucknow Metropolitan City



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Abstract

This study is trying to understand the level of noise pollution in different areas of the Lucknow city and find out the interrelationship between the number of vehicles and the level of noise pollution. By this study this is found that the level of noise pollution have declined at all monitoring locations except Hussainganj, Amausi and Gomti Nagar between 2006 and 2018. The difference of noise level at day time in residential areas during this period is found highest decrease in Aliganj (32.3 dB) and lowest in Gomti Nagar (8.7 dB) and the night time difference of noise level is highest decrease in Indra Nagar (-19.8 dB) and lowest in Gomti Nagar (+12.7 dB). In commercial areas, the day time difference of noise level during this period is found highest increase in Charbagh (24.8 dB) and lowest in Hussainganj and the night time difference of noise level is found highest decrease in Chowk (29.6 dB) and lowest in Aminabad (-10.6 dB). The day time difference of noise level in industrial areas is increased in Amausi (+6.6 dB) but it is decreased in Talkatora (-9.6 dB) and night time difference of noise level is decreased in Talkatora (-34.45 dB) and Amausi (22.3 dB) both. The number of vehicles have increased approximately 110% between 2006 and 2018 in Lucknow city but the level of noise pollution have declined at all monitoring locations except Hussainganj, Amausi and Gomti Nagar. This is found that there is no reciprocal relation between the number of vehicles and level of noise pollution.

Keywords: Noise Pollution, Number of Vehicles, Permissible Noise Levels.

Introduction

Deteriorating noise pollution is a major problem in many large urban areas in both developed and developing countries. It is one of the scourges of the modern world. It is an unwanted product of our technological civilization, and is becoming an increasingly dangerous and disturbing environmental pollutant. There is an growing public awareness and even some progress in the fight against air and water pollution, but the third jeopardy-noise pollution- has only recently begun to gain attention. Since the industrial revolution the daily lives of people, particularly in urban environment, have been invaded by unwanted and disruptive sounds. Traffic noise which has been generally accepted without complaint until recently has become intolerably noticeable. Not only the actual number of operating motor vehicles increasing annually but there is an upward trend in speed and weight, plus an always universal adoption of diesel engine for commercial vehicle use. There are so many causes for noise pollution but the greatest increase in the noise level of metropolitan cities has been directly related to the vehicular noise. The number of vehicles in Lucknow metropolitan city is growing rapidly. it can be seen in table.1.

Elevated noise levels have been associated with adverse impact on human health, ranging from minor annoyance to physiological damage. As such, traffic noise has become a major environmental concern and a source of an ever-increasing level of discomfort particularly in urban areas with high traffic congestion. The sources of noise in the urban settings are primarily vehicular engines; exhaust systems, aerodynamic friction, and tyre-pavement interaction. Traffic noise is affected by factors such as traffic volume and speed, vehicle mix, pavement type, and vehicle conditions. Pollution derived from traffic can be considered one of the major problems of modern cities. Although considerable efforts have been devoted to gathering information about noise pollution and its control, little attention has been paid to the analysis of relationships between pollution distribution and number of vehicles in the city. The existence of these relationships

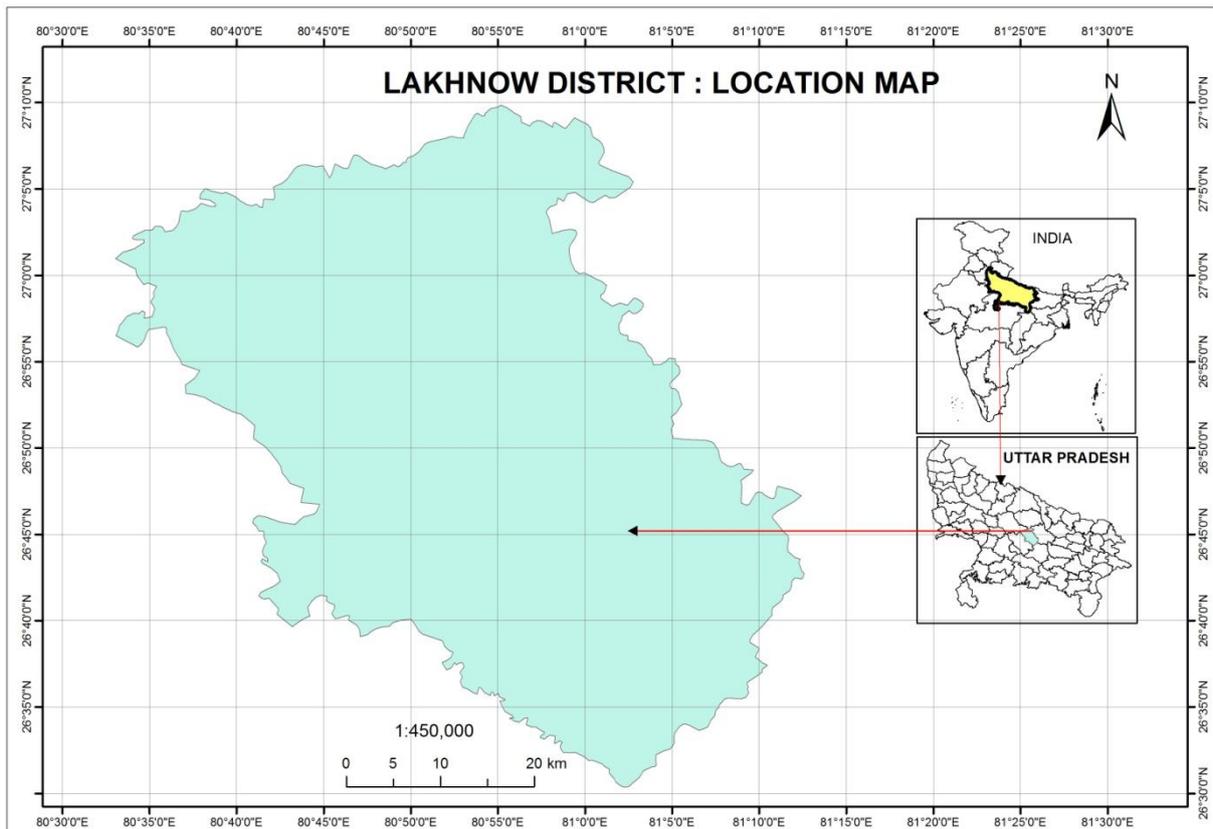
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would enable better prediction and prevention of noise pollution through planning of transport system.

Study Area

Lucknow Metropolis lies between the coordinates of 26° 30' N to 27° 10' N latitudes and 80° 30' E to 81° 13' E longitudes. It is the capital city of the most populous state of Uttar Pradesh in India. Lucknow is situated in the middle of Gangetic Plain and spreads on the banks of the river Gomati, a left bank tributary of river Ganga. It enjoys a central position in the state of Uttar Pradesh. It is bounded on the north by Sitapur, on the south east by the Rae Bareilly, on the north east by Barabanki, on the North West by Hardoi and on the south west by Unnao. The height of Lucknow city above mean sea level is 123 meters. The total land area of Lucknow city is 310 Sq. km. Lucknow has got an extensive network of roads and railways and it has grown all around in a radius of 25 Km. the road network is primarily of radial pattern. Nine regional roads converge into the city from all directions linking Lucknow to Kanpur, Sultanpur, Kursi, Faizabad, Hardoi, Rae Bareilly, and Mohaan. The city is very favorably located at a junction of three National Highways other five Provincial Highways. The NH-24 links it to Delhi in the north; NH-25 links it to the west and south via Kanpur,

Jhansi and Bhopal; and NH-28 links to Patna and Calcutta in the east via Gorakhpur. Kanpur and Lucknow are separated only by 80 kms. Lucknow - Kanpur area has become an area of intense interaction reflected by changes in land use, mushroomed development in all sectors of the economy. It is also well connected with the railway network falling in the Northern and North Eastern railway zones. Almost all the major train routes touch this city. It has good rail network touching all the important rail junctions in the country. Railway ministry has given some special train to Lucknow. The famous Satabdi and Rajdhani express passes from Lucknow to various part of the country. The city has two major railway stations one is Lucknow railway junction and other is Charbagh station. The major railway lines are Lucknow-Kanpur-Jhansi, Lucknow-Delhi, Lucknow-Gorakhpur, Lucknow-Rae Bareilly. Lucknow is well connected with the other important towns and cities of the country by air routes. Lucknow has direct flight to Delhi, Mumbai, Bangalore, Patna and Sarjah. The Lucknow airport located in Amausi is only 20 km far from the city and has 7453 feet long runway. The Air India, Indian Airlines and Sahara airways has regular scheduled flights from Lucknow to other parts of country.



Objectives of the Study

1. To analyze the relationship between increasing the number of vehicles and level of noise pollution.

2. To assess day and night time noise to ensure compliance of permissible noise levels.
3. To create public awareness about noise pollution.

Methodology

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This paper is based on the analyses and comparative study of secondary data from different source. Assessment of Environmental status of Lucknow City published by Indian Institute of Toxicology Research (Lucknow), published books, research articles and papers and unpublished Ph. D. thesis. This entire study is based on comparative approach. Researcher has trying to find out the relation between the Number of vehicles and the level of noise pollution in different part of the city.

Total vehicle of different categories registered with RTO, Lucknow in 2006 were 8,24,003 and 17,30,398 in 2018. (The data of number of vehicles of 2014 and 2018 are based on the statistical calculation of previous data by the researcher). Number of vehicles are increased during 2006-2018 is 9,06,395 which is approximately 110 % higher than 2006. The details are given in Table 1.

Table 1
Registered Vehicle with R.T.O. Lucknow during 2006 to 2018

Sl. No.	Type of Vehicle	Number of Registered Vehicles On 31st March			
		2006	2010	2014	2018
1	Multi Axial	917	2134	2668	3334
2	Medium and Heavy weight Vehicles (Four wheeler)	8014	8631	10789	13486
3	Light Commercial Vehicles(Three wheeler)	2930	3702	4628	5784
4	Light Commercial Vehicles (Four wheeler)	5365	4532	5665	7081
5	Buses	3978	2930	3663	4578
6	Taxi	5979	5055	6319	7898
7	Three wheelers and Auto Rickshaw	12502	7410	9263	11578
8	Two wheelers	660093	890442	1113053	1391316
9	Car	94222	145996	182495	228119
10	Jeep	12428	14910	18638	23297
11	Tractor	13385	16464	20580	25725
12	Trailers	991	1182	1478	1847
13	Others	3199	4067	5084	6355
Total		824003	1107455	1384319	1730398

Source: Regional Transport Office(R.T.O.),Lucknow

The highest increase in the percentage of vehicles in all types of vehicles during 2006-2018 is found in Multi Axial vehicles (363.5%).The percentage of three wheelers(auto rickshaws) is decreased during this period.

Consumption of Fuel in Lucknow, the sales figure of oil companies for the year (2009-10) has been compared with sale figure of 2005-06 (Table 2). It is observed that petroleum sale have been increased by 31.64 % whereas sale of diesel has increased by 18.37%.

Table 2
Consumption of Fuel (in KL) in Lucknow

Sl. No.	Agency	Petrol (Unleaded)			High Speed Diesel		
		Apr., 05 to Mar., 06	Apr. 09 to Mar. 10	% increase in consumption	Apr., 05 to Mar., 06	Apr. 09 to Mar. 10	% increase in consumption
1	IOC	36,186	60163	66.26	43,116	66719	54.74
2	BPCL	26,727	28828	7.86	24221	22252	-8.12
3	HPCL	19,853	19968	0.57	28,778	24808	-13.79
	Total	82766	108959	31.64	96115	113779	18.37

(1 KL = 1000 litres). Source: Indian Oil Corporation (IOC), Lucknow

The highest increasing percentage of sales figure of oil companies during 2006-2010 is found in IOC in petrol (66.26 %) and diesel (54.74 %) both segment. percentage of selling of BPCL and HPCL in diesel segment has been decreased during 2006-2010.

Noise Level Measurements

The measurement of noise level was carried out at twelve (12) locations for 30 minutes at each

location during the day time (6 AM to 10 PM) and night time (10 PM to 6 AM). All measurements were made with the "A" weighing filter at a height of receptor organ, i.e.,~1.5 meters above the ground level by the Indian Institute of Toxicology Research. The location for the noise level measurement is given in Table.3.

Table-3
Noise Level Measurements

Sl. No.	Area	Location	Noise level dB(A) in 2007		Noise level dB(A) in 2010		Noise level dB(A) in 2014		Noise level dB(A) in 2017	
			Day	Night	Day	Night	Day	Night	Day	Night
1	Residential	Aliganj	73.5	64.1	56.1	54.6	43.6	49.1	41.2	46.73
		Vikas Nagar	71.9	65.8	55.1	57.9	42.6	53.07	39.8	50.13
		Indira Nagar	74.6	71	68.8	61.2	64.8	54.55	63.7	51.13
		Gomti Nagar	68.7	61.3	63.6	67.9	60.8	70.87	60	74.01
		Standard	55	45	55	45	55	45	55	45
2	Commercial	Hazratganj	76.9	62.8	68.8	67.3	62.5	70.04	60.9	72.8
		Hussainganj	77.7	68.4	85.7	60.9	92	56.08	94.8	53.37
		Charbagh	78.9	74.5	66.6	64.3	56.8	57.57	54.1	52.65
		Alambagh	79.5	75.2	76.9	66	74.9	59.92	74.4	56.11
		Aminabad	76.9	60.8	67.1	66.1	59.9	68.96	57.8	71.48
		Chowk	73.5	69.5	68.1	53.9	64.6	45.32	63.7	39.91
	Standard	65	55	65	55	65	55	65	55	
3	Industrial	Amausi	72.1	68.5	75.3	57.1	77.8	50.9	78.7	46.2
		Talkatora	77.8	70.9	73	54.4	69.4	52.15	68.2	36.45
		Standard	75	70	75	70	75	70	75	70

Source : Report of Indian Institute of Toxicology Research(2007 and 2010). Lucknow

(The data of noise level of 2014 and 2017 are based on statistical calculation of the previous data by the researcher)

In residential areas, the day time noise level were recorded highest at Indra Nagar(74.6 dB) and lowest at Gomti Nagar(68.7 dB) in 2007. In 2018 the day time noise level is calculated highest at Indra Nagar (63.7 dB) and lowest at Vikas Nagar (39.8 dB).

In commercial and traffic area the day time noise level were recorded at highest at Almbagh (79.5 dB) and lowest at Chowk (73.5 dB) in 2007. In 2018 the day time noise level is calculated highest at Hussainganj (94.8 dB) and lowest at Aminabad (57.8 dB).

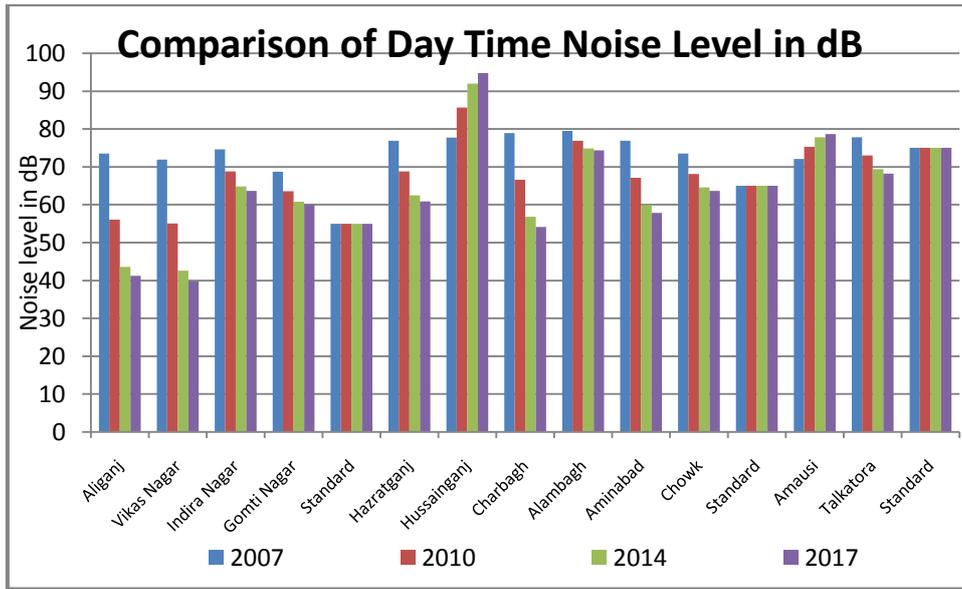
In residential areas, the night time noise level were recorded highest at Indra Nagar (71.0 dB) and lowest at Gomti Nagar (61.3 dB) in 2007. In 2018 the

night time noise level is calculated highest at Gomti Nagar (74.1dB) and lowest at Aliganj (46.7 dB).

In commercial and traffic area the night time noise level were recorded at highest at Almbagh(75.2 dB) and lowest at Aminabad (60.8 dB) in 2007. In 2018 the night time noise level is calculated highest at Hazratganj (72.8 dB) and lowest at Chowk (39.9 dB).

In industrial areas, Amausi and Talkatora the day and night time noise level were recorded between 72.1 to 77.8 and 68.5 to 70.9 dB (A) respectively in 2007. Noise level at Talkatora in the day time and night time were higher than the prescribed standard of 75 and 70 dB (A) respectively in 2007 but it was lower than the prescribed standard of 75 and 70 dB respectively in 2018.

Diagram 1



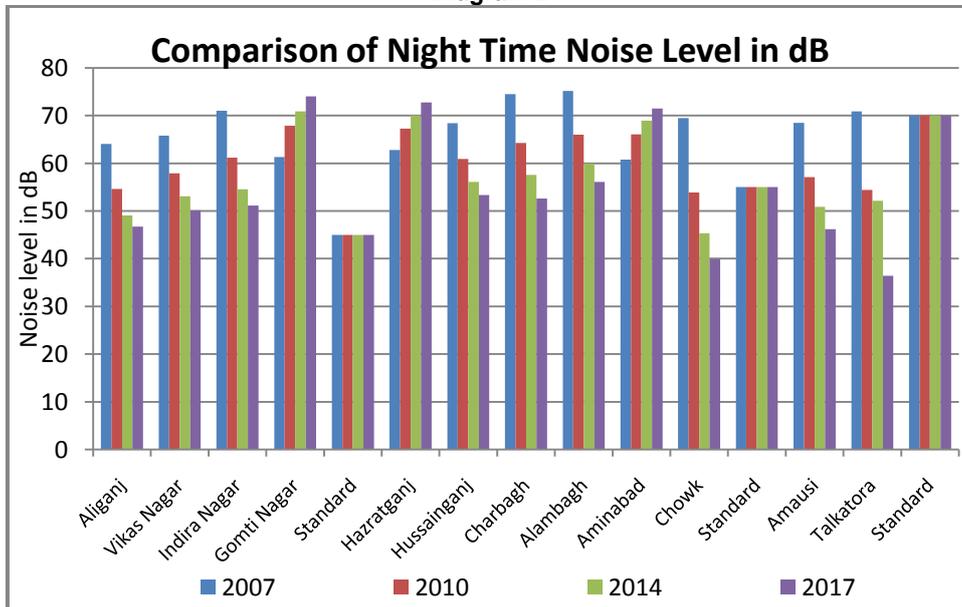
In residential areas, the day time difference of noise level between 2007 and 2018 is highest decrease in Aliganj (32.3 dB) and lowest in Gomti Nagar (08.7 dB). All the values (in day time) are decreasing in 2010 but higher than the prescribed limit of 55 dB(A) except Aliganj and Vikas Nagar.

In commercial and traffic area, the day time difference of noise level between 2007 and 2018 is

highest decrease in Charbagh (24.8 dB) and lowest in Hussainganj .All the values (in day time) are decreasing in 2018 except Hussainganj, which is increased.

In industrial areas, day time difference of noise level is increased in Amausi (+6.6 dB) but it is decreased in Talkatora (-9.6 dB). Talkatora is reached out of the prescribed limit of 75 dB.

Diagram 2



In residential areas, the night time difference of noise level between 2007 and 2018 is highest decrease in Indra Nagar (-19.8 dB) and lowest in Gomti Nagar (+12.7 dB). All the values (in night time) are decreasing in 2018 except Gomti Nagar. But the all values are higher than the prescribed limit of 45 dB (A).

In commercial and traffic area, the night time difference of noise level between 2007 and 2018 is highest decrease in Chowk (29.6 dB) and lowest in Aminabad (-10.6 dB). All the values (in night time) are

decreasing in 2010 except Aminabad (-10.6 dB) and Hazratganj(-10 dB), which is increased .

In industrial areas, night time difference of noise level is decreased in Talkatora (-34.45 dB) and Amausi (22.3 dB) both. All the values are lower than the prescribed limit of 70 dB (A).

Conclusion

In residential areas, the day time noise level were recorded highest at Indra Nagar (74.6 dB) and lowest at Gomti Nagar (68.7 dB) in 2007 and In 2018 the day time noise level is calculated highest at Indra

Nagar (63.7 dB) and lowest at Vikas Nagar (39.8 dB). The night time noise level were recorded highest at Indra Nagar (71.0 dB) and lowest at Gomti Nagar (61.3 dB) in 2007. In 2018 the night time noise level is calculated highest at Gomti Nagar (74.1dB) and lowest at Aliganj (46.7). The day time difference of noise level between 2007 and 2018 is highest decrease in Aliganj (32.3 dB) and lowest in Gomti Nagar (08.7). Night time difference between 2007 and 2018 is calculated highest decrease in Indra Nagar (-19.8 dB) and lowest in Gomti Nagar (+12.7 dB). In commercial and traffic area, the day time difference of noise level between 2007 and 2018 is found highest decrease in Charbagh (24.8 dB) and lowest in Hussaingan. The night time difference between 2007 and 2018 is calculated highest decrease in Chawk (29.6 dB) and lowest in Aminabad (-10.6 dB). In industrial areas, Amausi and Talkatora the day and night time noise level were recorded between 72.1 to 77.8 and 68.5 to 70.9 dB (A) respectively in 2007. Noise level at Talkatora in the day time and night time were higher than the prescribed standard of 75 and 70 dB (A) respectively in 2007 but it was lower than the prescribed standard of 75 and 70 dB respectively in 2018. The day time difference of noise level is increased in Amausi (+6.6 dB) but it is decreased in Talkatora (-9.6 dB). The night time difference is decreased in Talkatora (-34.45 dB) and Amausi (22.3 dB) both. All the values are lower than the prescribed limit of 70 dB (A).

The number of vehicles have increased approximately 110% during 2006-2018 in Lucknow city but the level of noise pollution have declined at all monitoring locations except Hussainganj and Amausi at day time and Gomti Nagar at night time. On the basis of this study we can say that there is not a reciprocal relation between the number of vehicles and level of noise pollution. This is found that the noise pollution is depends on technological up-gradation of the vehicles and traffic management.

On the basis of this study we find that few steps will be necessary for controlling the noise pollution. These steps are mentioned bellow as suggestions.

Suggestions

1. Improvement of fuel quality and checking of fuel adulteration.
2. Public awareness programme for automobile pollution is essential.
3. Pressure horns to be removed from all vehicles and avoid use of horn.
4. Public mass transport must be strengthened to minimize use of personal vehicle.
5. Encroachment should be removed for smooth flow of traffic.
6. Pressure horns to be removed from all vehicles and avoid use of horn.
7. Keep vehicles in good mechanical condition. Poorly maintained or malfunctioning vehicles can release more noise.

8. Extensive plantation should be done along the roads, in and around the public gardens.

References

1. Caselles, J., Colliga C and Zornoza P.: *Evaluation of trace elements pollution from vehicle emissions in Petunia plants. Water Air Soil Pollut*, 136, 1-9 (2002).
2. Curtis, L., Rea W., Smith-Willis P., Fenyves E. and Pan Y.: *Adverse health effects of outdoor air pollutants. Environ. Intern*, 32, 815-830 (2006).
3. Jayanthy, V. and Krishnamoorthy, R., *Key airborne pollutants- Impact on human health in Manali, Chennai, Curr sci*, 90, 405-413 (2006).
4. Jayaraman, G.N.: *Air Quality and respiratory health in Delhi. Environ Monit Assess DOI* 10.1007/s 10661-007-9651-0 (2007).
5. Kaushik, C. P., Ravindra K. and Yadav K. : *Assessment of ambient air quality in urban centres of Haryana (India) in relation to different anthropogenic activities and health risk. Environ Monit Assess.*, 122, 27-40 (2006).
6. Maitre, A, Bonnetterre V., Huillard L., Sabatier P. and Gaudemaris R.: *Impact of urbanatmospheric pollution on coronary disease. European Heart Journal*, 27, 2275-2284 (2006).
7. Monacci, F. and Bargali R.: *Barium and other metals as indicator of vehicle emissions. Water Air Soil Pollut.*, 100, 89-98 (1997).
8. Puliafito, E Guevara M, Puliafito C.: *Characterization of urban air quality using GIS as a management system, Environment pollut*, 122, 105-117 (2003).
9. *Report on "Assessment of Environmental status of Lucknow City (2007)" Indian Institute of Toxicology Research, Post Box 80 , Mahatma Gandhi Marg, Lucknow.*
10. *Report on "Assessment of Environmental status of Lucknow City (2010)" Indian Institute of Toxicology Research, Post Box 80, Mahatma Gandhi Marg, Lucknow.*
11. Sharma, K., Singh R., Barman S. C., Mishra D., Kumar R., Negi M. P. S., Mandal S. K., Kisku G. C., Khan A. H., Kidwai M. M. and Bhargava S. K. : *Comparison of trace metals concentration in PM10 of different location of Lucknow city. Bullet Environ Centum Toxicol.*, 77, 419-426 (2006).
12. Shrivastava. Dr.Lokesh, Kumar Rajneesh: *An Appraisal of Emerging Trends of Urbanisation and Urban Agglomeration in Madhya Pradesh. Vishlesana, research journal, RDVV Jabalpur, ISSN: 2393-9931. P. 207-219, Vol. No. 14(2017).*
13. Shrivastava. Dr.Lokesh, Kumar Rajneesh: *Emerging patterns of urbanization and economic development in Madhya Pradesh. IJAMH, ISNN(Online):2319-5231. Vol.6(2), P. 97-105(2017).*