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# Monitoring of Noise Pollution and Impact of Odd-Even Operation on it for a Specific Route in Delhi

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**Abstract—***Noise from road traffic is one of the major concerns in Delhi. Noise pollution by road traffic not only harms the pedestrians but also the nearby vendors.*
*Delhi government had implemented the odd-even rule on four wheelers for 8 days (from 4-15 November 2019) in the territory of Delhi. In the current study, we have measured the noise levels by using MEXTECH SL-36 Sound meter instrument at five traffic locations (i.e., Uttam Nagar, Dwarka Mor, Delhi Gate (Najafgarh), Nangloi & Peeragarhi) in selected study route in Delhi during odd-even rule implementation and without odd-even rule implementation. The study would also provide remedial measures that can be implemented to reduce noise levels.*

**Keywords***: Noise pollution, Noise level, Traffic.*

## Introduction

Noise is one of the major pollutants from which we encounter in our daily life. It is the unpleasant, distressing and unwanted sound that must be avoided because of its adverse aural and non-aural effects like hearing disorder and stress respectively. Noise pollution is becoming a major public health concern and children affected by it may be at risk of poor performance at school [1]. The noise produced by vehicular traffic is more disturbing near junctions, where the number of flows is crossing [2]. Due to the change in the lifestyle of new generations, a sharp increment in the number of vehicles can be seen and hence causing an increase in noise pollution. The number of vehicles in the national capital surged to 1.09 crore by March 2018, including over 70 lakhs two-wheeler.[3].

The amplitude is decreasing towards buildings from the supply. Noise level is higher on the far side than that of the near side and the reason for this is the return trip to home is more [4].

As per the WHO noise guidelines (2018), For average noise exposure, it strongly recommends reducing noise levels produced by road traffic below 53 dB, as road traffic noise above this level is associated with adverse health effects. For night noise exposure, it strongly recommends reducing noise levels produced by road traffic during night time below 45 dB, as road traffic noise above this level is associated with adverse effects on sleep. [5].

In the past, several studies are done and several are going on related to noise pollution. In most of the studies, we found that noise pollution level is above the permissible standards given by concerned authorities. One of the recent studies showed no significant changes in noise level during the implementation of odd-even rules in Delhi [6]. Another study showed that most of the studied locations are severely affected by the noise exposure of up to 80 dB [7].

The traffic noise problem is not properly recognized despite the fact that it is steadily growing in developing countries [4]. The ambient air quality standards in respect of noise given by CPCB [8] is shown in Table 1.

**Table 1: CPCB Standards for Noise**

| Area Code | Categories of Area/ Zone | Day Time (dB(A)) | Night Time (dB(A)) |
|---|---|---|---|
| A | Industrial area | 75 | 70 |
| B | Commercial area | 65 | 55 |
| C | Residential area | 55 | 45 |
| D | Silence Zone | 50 | 40 |

The third phase Odd-even rule was implemented in Delhi from 4th November 2019 to 15th November 2019. Under the purview of the odd-even rule, non-transport four-wheeled vehicles having registration number ending with odd digits would be prohibited on even dates of the month of November. On the other hand, plying of non-transport four-wheeled vehicles having registration number ending with even digits to be prohibited on odd dates of the month of November. The rule was applicable from 8:00 a.m. to 8:00 p.m.

## 2. Site Selection

To measure the traffic noise pollution, the first priority is site selection. For this, we had selected a route (Figure 1) in Delhi. And here, we found five traffic locations which are the main junctions of the selected route. These five traffic/study locations are –

1. Uttam Nagar
2. Dwarka Mor
3. Delhi Gate (Najafgarh)
4. Nangloi
5. PeeraGarhi.

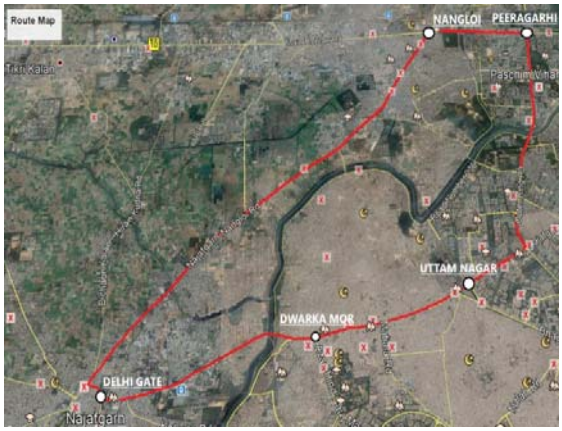


**Figure 1: Study Locations in Route Map**

## 3. Materials and Methodology

The objective of this study was to differentiate the road traffic noise levels in Delhi during normal days and when the Odd-even rule implemented. MEXTECH SL-36 Sound level meter (Figure 2) used for noise level measurements. The sound level meter held at a height of 3.5 feet from top of the road level as recommended by Central Road Research Institute.


**Figure 2: Mextech SL-36 Sound Level Meter**

The microphone is protected with a foam material to block any dust or prevent any wind harm and pre-calibrated. The MEXTECH SL-36 Sound Meter has measurements ranging from LP: 30~130dB(A). It has a resolution of 0.1dB(A) and an accuracy of ±1.5 dB(A). The instrument has two response type fast and slows i.e., fast response type indicates that reading change at the rate of 125ms and slow response type indicates that reading change at the rate of 1000ms. The study is done generally in fast response type to obtain more accurate readings. The instrument also has the maximum and minimum functions that provide the maximum and minimum noise level of the particular traffic location.

This stage of the study is comprised of two parts i.e. part A and part B. In part A, data collection was done on days with no odd-even rule implementation. In part B, data collection was done during odd-even rule implementation. In each phase, the traffic noise levels recordings were prepared by taking readings at 10-minute (i.e., 5 minutes for max. and 5 minutes for min. reading) count for six times via sound level meter during peak hour (8:00a.m.-11:00a.m approx..) and non-peak hour (11:30a.m-4:00p.m. approx..) at preselected locations(Uttam Nagar, Dwarka Mor, Delhi Gate (Najafgarh), Nangloi, PeeraGarhi) in Delhi.

## 4. Result and Discussions

The maximum and minimum noise level is collected from the five study locations in part A and part B and average noise levels reading in dB(A) are obtained for the same.

Further using the average noise levels at five locations graphs are plotted to see variation during peak hours and non-peak hours for the five study locations.

### Part -A

In part A, readings are taken in normal days during peak and non- peak hours. The average noise levels at five study locations is shown in Table 2.

**Table 2. During Normal Days**

| Study Locations | Avg. noise levels during Peak Hours [dB(A)] | Avg. noise levels during Non-Peak Hours [dB(A)] |
|---|---|---|
| Uttam Nagar | 91.70 | 81.00 |
| Dwarka Mor | 89.32 | 88.43 |
| Delhi Gate | 87.17 | 87.87 |
| Nangloi | 88.44 | 89.25 |
| PeeraGarhi | 91.26 | 88.83 |

The graph using the data in Table 2 is plotted (as shown in Figure 3). The graph shows that average noise pollution during peak hours is greater than non-peak hours except at Delhi Gate and Nangloi where it is opposite. The maximum and minimum noise level 91.70 dB(A) and 81.00 dB(A) respectively are both found at Uttam Nagar T-junction. And also, there is no visible change in noise level during peak and non-peak hours at Dwarka Mor, Delhi Gate and Nangloi.

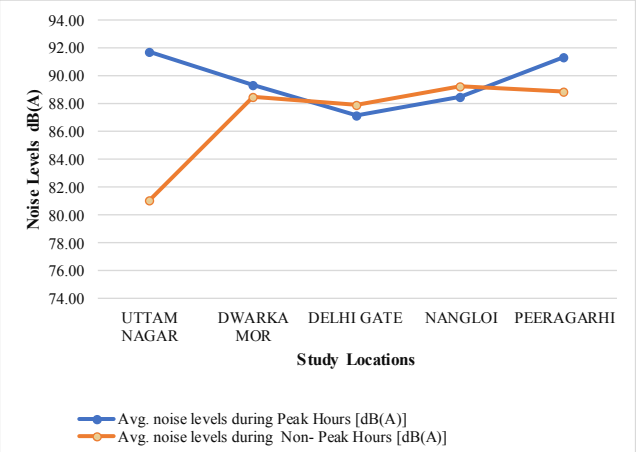


**Figure 3: Average Noise Levels During Normal Days**

### Part- B

In part B, readings are taken during odd-even rules implementation. The average noise levels at five study locations is shown in Table 3.

**Table 3. During Odd-Even Rules Implementation**

| Study Locations | Avg. noise levels during Peak Hours [dB(A)] | Avg. noise levels during Non-Peak Hours [dB(A)] |
|---|---|---|
| Uttam Nagar | 90.35 | 88.53 |
| Dwarka Mor | 88.00 | 90.63 |
| Delhi Gate | 88.73 | 88.71 |
| Nangloi | 89.84 | 89.32 |
| PeeraGarhi | 89.84 | 89.30 |

The graph using the data in Table 3 is plotted (as shown in Figure 4). The following graph shows the different conditions as compared to noise levels during normal days (see Figure 3). Here, we found the maximum noise level i.e., 90.63 dB(A) during non-peak hours at Dwarka Mor. This is due to the more traffic density during non-peak hours in comparison to peak hours at Dwarka Mor. At Delhi Gate, there is almost the same noise level found during peak and non-peak hours. Also, almost the same noise levels are found at Nangloi and PeeraGarhi.

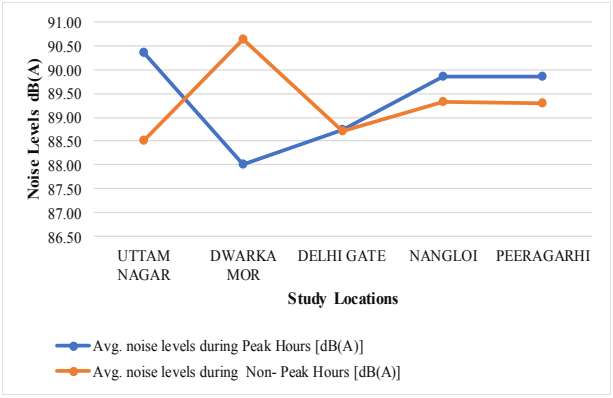


**Figure 4: Average Noise Levels During Odd-Even Rules Implementation**

## 5. Conclusions

Both the graphs behave unexceptionally as per our thoughts. Though Odd-even rules are implemented in Delhi to conquer Air Pollution. But its main focus on decreasing the traffic density. So, due to the decrease in traffic density, there should be a decrease in Noise levels in Delhi. But we don't find any significant change in noise levels during odd-even rules implementation in our study. Rather than finding any decrease in noise level, we find maximum noise levels at some locations.

The main reason for that is the public's unawareness of Noise pollution. This is because of its invisibility. Another reason for this is that Odd-even rule is implemented with many exceptions, for example, exemptions for women drivers, commercial vehicles etc.

The noise levels obtained at different locations exceed the standard noise limits given by CPCB.

Also, the noise levels are almost the same during odd-even rule implementation at Nangloi and PeeraGarhi.

## 6. Remedial Solutions

The following solutions can be implemented to reduce noise levels: –

1. Creating awareness and education on the consequences of noise pollution.
2. Planting trees on roadside and road divider area.
3. Increasing enforcement at the junction.
4. Putting pressure on governing authority to strictly implement noise regulation policies.
5. Installing “No Horn Zone” Boards near the silence zone.
6. Relocating the roadside vendors.

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