

**Original Article****TRAFFIC CONGESTION AND FUEL WASTAGE DUE TO IDLING VEHICLES AT CROSSROADS****Bansal Neha<sup>1</sup>, Patel Sushil<sup>2</sup>, Panchal Saishav<sup>2</sup>**<sup>1</sup>7th Semester B.E. (Electrical Engineering Student, Government Engineering College, Surat- 395 001, <sup>2</sup>Post Graduate Residents, <sup>3</sup>Intern, Dept. of Community Medicine, Surat Municipal Institute of Medical Education & Research, Surat, Gujarat**Correspondence:** nbansalsurat@gmail.com**ABSTRACT**

This study carried out at among a very busy signal point of Surat city reveals that the congestion of two wheelers, three wheelers and four wheelers is indeed very high at peak traffic hours and the movement of vehicles is very slow. The vehicle problem is much accentuated by the bicycles and the pedestrians which results in a very slow traffic movement even when the traffic lights switch green, especially for the lanes from SMIMER to Sahara Darwaja and vice versa. The snail like pace of vehicles prompts the impatient vehicle owners to leave their engines idling so as to zealously seize any opportunities for small advancements, leading to colossal fuel wastage and health hazards associated with exhaust fumes. The study points to the need for appropriate siting of overbridges and proper traffic management at such busy sites to help conserve precious petroleum imports and preserve our environment.

**Keywords:** Traffic congestion, cross roads, fuel wastage**INTRODUCTION:**

In developing countries like India, rapid urbanization and industrialization coupled with rapid population growth has led to explosion in the number of vehicles in recent years. At the same time our roads infrastructure and our traffic management system has not been designed to cope with such a heavy vehicular load, leading to heavy traffic congestion at busy signal points in big cities as Surat. This problem is further exacerbated in areas where large commercial industries establishment are also housed, such as the textile markets near Sahara Darwaja, as in these areas a large number of commercial vehicles ply round the clock and the large number of workers associated with these industries combinedly clog the roads. All of these factors cumulatively lead to a situation of heavy traffic congestion at traffic signals and intersections. This results in a very slow traffic movement even when the traffic lights switch green, especially for the lanes from SMIMER to Sahara Darwaja and vice versa. The snail like pace of vehicles prompts the impatient vehicle owners to leave their engines idling so as to zealously seize any opportunities for small advancements, leading to colossal fuel wastage.

An idling vehicle is guilty of using up valuable fuel, not only unnecessarily wasting this expensive resource, but also causing danger to the environment and a risk to the health of many others.<sup>1</sup> Idle cars produce emissions that have been found to negatively affect respiratory health.<sup>1</sup> Idle vehicles emit pollutants like carbon dioxide. An engine that idles for 10 minutes yields 90 grams of this gas and consumes 0.14 liters of fuel.<sup>1</sup> Eliminating idling would cut about 196,000 metric tons of carbon dioxide from passenger cars and trucks alone, calculated from Environmental Protection Agency estimates and Bureau of Motor Vehicles statistics.<sup>2</sup> There is a recognized need for more efficient control of traffic at

intersections. Efficient traffic control is becoming an urgent necessity that affects vehicle owner's stress, vehicle energy consumption, and vehicle pollution due to unnecessary vehicle idling and travel time. These consequences, when cumulated by the gross number of cars, contribute to nationally significant financial costs, environmental pollution and energy consumption figures.<sup>3</sup> There is the need to measure the amount of idling at various traffic junction, so that the cumulative magnitude of the problem of idling can be established and steps taken to prevent vehicle idling. It needs mention that countries as India are dependent on oil exports, which account for a major chunk of exports. Therefore, oil conservation efforts would also mean rich dividends for our country in terms of conservation of foreign currency reserves. The purpose of the study is to assess the idling profile of vehicles at Sahara Darwaja, an extremely busy traffic junction of Surat city and highlight measures to prevent the same. .

**MATERIALS AND METHODS:**

This observational study was conducted at Sahara Darwaja cross-roads, one of the most busy traffic point in Surat city, during morning (9:30-10:30 am) and evening (8:30-9:30 pm) peak hours. The four lanes at this cross roads, Railway Station to Sahara Darwaja, SMIMER hospital to Sahara Darwaja, over bridge at textile market to Sahara Darwaja and textile market to Sahara Darwaja have been considered in the study. We have categorized vehicles in three major categories: Four wheelers, three wheelers and two wheelers, with sub-categorized accordingly. The number of stationary vehicles before the junction, number of vehicles passing cross roads at one signal change, time duration for stationary vehicle standing last to pass the junction, percentage of stationary vehicles with their ignition on and time duration of green and red signal of each lane was observed and recorded.

**OBSERVATION:**

The Sahara Darwaja junction is situated near textile market with peak traffic hours being 9:30-10:30 a.m. and 8:30-9:30 p.m., though traffic can be quite high during the day timings as well. It can be seen from the figures as given in the table that heavy vehicular congestion was relatively more on the lanes which comes towards the textile markets during the morning peak hours, and in the evening peak hour heavy vehicular congestion was seen on the opposite direction, i.e. the lane which comes from the textile

market and also on the lane from SMIMER hospital towards Sahara Darwaja. The considerable vehicular congestion was seen in other lanes also during these peak hours. This leads to idling of vehicles at the cross road junction, and it leads to wastage of gallons of petroleum. In India, estimates are not readily available, however, the American Trucking Association states that one hour of idling per day for one year results in the equivalent of 64,000 miles in engine wear when adding up all the contributing factors.<sup>4</sup>

**Table 1: Number of Stationary Vehicles at Crossroads in the Concerned Lane**

Time	Lane	4 wheelers				3 wheelers		2 wheelers			Total vehicle
		To Sahara Darwaja	Small size	Medium size	Large size	Truck/bus	Autos	Goods tempo	Motor cycle	Scooty	
Morning	Station	2	2	1	0	46	3	45	5	0	104
	SMIMER	4	3	4	7	35	5	48	8	3	117
	Overbridge	15	6	2	0	15	3	58	8	2	109
	Textile market	3	0	1	1	55	3	10	3	0	76
Evening	Station	2	0	1	0	27	2	10	2	0	44
	SMIMER	5	3	2	2	30	2	38	7	4	93
	Overbridge	4	5	1	2	15	1	19	18	3	68
	Textile market	4	1	0	3	30	4	60	6	3	111

A favourable finding was the fact that the duration of the Green signal was higher for the lanes which were witnessing the maximum traffic and these timings

were variable throughout the day depending upon the expected flow for various lanes during the concerned timings as seen in table 2 and 3.

**Table 2: Number of Vehicles Passing Crossroads during Signal Change**

Time	To Sahara Darwaja	Four wheeler	Three wheeler	Two wheeler	Total vehicles
Morning	Station	8	63	58	129
	SMIMER	19	56	110	185
	Overbridge	32	19	68	119
	Textile market	6	58	15	79
Evening	Station	3	40	14	57
	SMIMER	24	52	82	158
	Overbridge	13	18	44	75
	Textile market	8	39	76	123

This was reflected by a greater number of vehicles clearing the junction as compared to the number of vehicle congested in the lane during the red signal, despite the continuous flow of vehicles in the lane. The table also reveals the traffic profile of the vehicles passing the traffic signal pattern at Sahara Darwaja. It can be observed that the maximum vehicular rush is on the lane from SMIMER hospital

to Sahara Darwaja. Many a times, there is traffic mismanagement when vehicles continue to ply even after the Green signal turns Red or some vehicles sneak by when the traffic cop is not vigilant or engaged in discussion with a vehicle. This consequently leads to traffic jam with stationary or very slow vehicle movement and idling of vehicles due to the heavy vehicular rush.

**Table 3: Time duration of traffic lights at signal point (in seconds)**

Time	Lane	Green signal	Red signal
Morning	Station	60	242
	SMIMER	79	81
	Overbridge	128	201
	Textile market	66	221
Evening	Station	25	120
	SMIMER	76	112
	Overbridge	111	142
	Textile market	80	137

There is a need to ensure that such lapses in traffic management system are prevented especially during

peak hours. The vehicle problem is much accentuated by the bicycles and the pedestrians which clog these

traffic junctions and are simply unmanageable, resulting in a very slow traffic movement even when the traffic lights switch green, as compared to the actual number of vehicles would could have cleared the junction had the pedestrians been managed more efficiently, say through a overhead foot bridge.

There is a long waiting period for vehicles at the red signals during peak hours, this leads to idling of

vehicles at cross roads. The American Trucking Association states that one hour of idling per day for one year results in the equivalent of 64,000 miles in engine wear when adding up all the contributing factors.<sup>4</sup> If idling of one bus can reduce for 60 minutes per day, then it saves 90 gallons of fuel per year.

**Table 4: Time duration for vehicle standing last to clear the cross road (seconds)**

Time	Lane	4 wheeler	3 wheeler	2 wheeler
Morning	Station	140	130	114
	SMIMER	148	136	140
	Overbridge	106	102	128
	Textile market	150	156	160
Evening	Station	98	88	96
	SMIMER	110	120	115
	Overbridge	130	126	98
	Textile market	125	106	87

Table 4 reveals that such a long waiting time leads to colossal wastage of fuel and man time. The waiting period for the vehicle is more on the lane from SMIMER hospital to Sahara Darwaja, in line with the

findings of the earlier tables, revealing the need to extend the opening exit of the overbridge from Sahara Darwaja to New Bombay Market for the incoming traffic headed from Udhna Cross roads.

**Table 5: Percentage of vehicles with running engines while waiting at red signals**

Time	Lane	4 wheeler	3 wheeler	2 wheeler
Morning	Station	80	71.4	56.6
	SMIMER	88.9	87.5	84.7
	Overbridge	73.9	94.4	58.8
	Textile market	100	77.9	61.5
Evening	Station	66.6	80.6	41.6
	SMIMER	100	93.4	77.6
	Overbridge	83.3	93.8	75
	Textile market	100	94.1	87

Table 5 reveals that 80% to 100% of 4 wheeler & 3 wheeler owners keep their engines switched on while waiting at red signals. Similarly 50% to 80% of 2 wheeler owners also keep their engines switched on while waiting at red signal. This idling of engines leads to heavy avoidable fuel wastage, vehicular engine damage, respiratory problems, release of Greenhouse gases and contributes towards global warming.<sup>5</sup> It has been documented that the exhaust fumes released during idling from gasoline and diesel engines contain harmful pollutants including nitrogen oxides, carbon monoxide, volatile organic compounds, and fine particles leading to much more respiratory infections and chronic bronchitis, and trigger asthma attacks, as compared to switched off and restarted engines.

The study reveals unacceptable patterns of vehicular idling and slow traffic movement at Sahara Darwaja traffic intersection and needs rectification through appropriate traffic management, encouraging lane driving, restricting pedestrians traffic to the footpaths, construction of overhead footbridge and extending

the opening exit of the overbridge from Sahara Darwaja to New Bombay Market for the incoming traffic headed from Udhna Cross roads. All the traffic points should be provided with the digital timer for red and green signal, so that people can know the waiting period at the traffic points, so that they can turn off their vehicles. There is strong need for the general public education regarding the traffic rule and importance of switching off their vehicles at the time of idling.

#### REFERENCES

1. <<http://ezinearticles.com/?How-Letting-Your-Vehicle-Idle-Can-Cost-You-Big-Money-At-The-Pump&id=343799>>.
2. <[http://www.thaindian.com/newsportal/health/vehicle-idling-contributes-to-greenhouse-gas-emissions\\_10058613.html](http://www.thaindian.com/newsportal/health/vehicle-idling-contributes-to-greenhouse-gas-emissions_10058613.html)>.
3. <<http://pollutionfree.wordpress.com/2010/01/10/intelligent-traffic-lights-and-idling/>>.
4. <<http://www.liveviewgps.com/reduce+fuel+consumption.html>>.
5. <<http://www.mtholyoke.edu/ehs/vehidle.html>>.