

A Study: Traffic Congestion in Samalkha Town

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Abstract

Samalkha town of Panipat district of Haryana state in India is an administrative center for 74 villages which consists of a population of almost 300 thousand including Samalkha town. The larger part of this population from most of the villages flooded to Samalkha town on a daily basis for shopping and other administrative works. No traffic signals, inadequate space for market, low road spaces and overtaking tendency by road users are responsible for creating long-term traffic congestion on railway road. Due to this substantial portion of working hours got wasted on the streets which indirectly affect the overall economy and causing serious air pollution and noise pollution which affects the environment. The Government needs to construct wider roads, shifting of vegetable vendors from roads to specified vegetable marketplace, curb to heavily loaded trucks. Samalkha being located on NH1, one of the busiest national highways in the country possessing industrial and trade importance, automobile exhaust contribute considerably to pollution. Inadequate native transport means that, the absence of bye-pass roads, encroachment of roads and lanes, inadequate traffic management, etc exaggerate the contribution level of automobile exhaust to pollution. The fuel employed in most of the vehicles is either diesel or fuel. By reducing holdup, this town can play a very important role in the economy of Haryana state by ensuring clean and healthy environment which is noise free and pollution free.

Keywords: *Samalkha, Traffic-jam, Economy, Environment, Panipat district.*

INTRODUCTION

Samalkha town traffic congestion considered most chaotic one in the district of Panipat due to its location on NH-1. Residents of Samalkha undergo physical stress and suffer financially and health losses. Print media constantly highlighting the sufferings of residents and commuters, but there is no solution to the problem. The local authority said a lot about the restriction to heavy loaded traffic and enforcement on railway road which is the major site of traffic congestion.

Various efforts made by local social welfare groups and youngsters of Samalkha town which include public meetings with higher authority officers such as the head of the police station and of Panipat as well. Truck drivers, rickshaw pullers, car drivers continue to be as negligent as before in the past. Local authorities including police personnel were blamed to collect weekly or monthly from the roadside vendors as bribes. The basic problem is existing road network is incapable in handling increasing traffic due to the population growth in Samalkha in past years. Available road space encroaches make a problem worse. Cars,

Bikes, auto-rickshaw, E-rickshaw and other light vehicles parked almost everywhere and the condition gets worse at the time of sowing and harvesting of crops.

Shuichi and Hironao (2003) suggest that by improving traffic signaling strategies can improve the traffic conditions of streets. Prskawetz, Leiwen and O'Neill (2004) have observed that demographic characteristics affect the overall demand for the automobiles. Recently there is a study in Brazil of environmental impact due to automobiles (Fioravante et al, 2009). According to our observations the situation here is due to lack of effective designing and correct specializing in the problems of traffic congestion in Samalkha city, it's become a significant drawback today. Adequate analysis and a few different solutions would possibly offer America some hope and lightweight to unravel the traffic drawback in Samalkha town.

OBJECTIVE

Objective and Scope of the study is limited to –

- To get information from ground level which includes direct interviews from

general population, shopkeepers and government officials.

- To get overview on how to measure congestion and to apply these measures in context of Samalkha city.
- To establish all the doable causes of holdup in Samalkha city,
- To establish all the doable solutions for the holdup in Samalkha city.
- Economic impact and profit analysis of the issues and solutions on the idea of Fuel Consumption, Overall transportation Overall transportation price, Health problems, atmosphere connected problems.

METHODOLOGY

3.1 Collection of data: Our information is needed from all the stakeholders associated with traffic jams.

(a) People who are suffering from traffic jams:

Data has been collected from the residents and local vendors through personal interview. This group of shopkeepers is suffering most due to the fact that there is no space available in front of their shops due to road jam and roadside vendors

acquiring space illegally. Also, a survey has been done to study the modal choice of the Samalkha town people.

(b) Government officials who are in the organizations to make rules:

Government officials including traffic police in charge were asked to give their views about the present scenario of the Samalkha town road jam and what they are exactly doing in this context. Also, requested to provide us data including no. of registered vehicles such as in different categories such as four wheelers, two wheelers and three wheelers in the town

Data Source

(a) Focused Group discussion

Group discussions were organized by the local social welfare groups to discuss core reason behind the road jam and what should be the desired steps to be taken to reduce the traffic jam.

(b) Direct observation

We have observed the situation at major sites of traffic jams in the town and realize that the problem is in its worst stage and steps must be taken to resolve the problem.

(c) Personal Interview

We have interviewed residents, shopkeepers and some government high officials from Samalkha to get to know their views and government plans.

Different modes of transport in Samalkha town

According to our observation from survey, the main transportation means that are used in Samalkha town are - Bus, Auto Rickshaw/rickshaw, E-rikshaw, Private Car, and Motorcycle. Trucks, Bicycle.

We cannot describe the real reason for the congestion from above available modal split shown in Figure 1 because of the fact that according to our study general population and shopkeepers ranked heavier vehicles highly responsible for traffic jam as compare to other factors. These trucks working for the industries for the Samalkha region tries to trespass the main market area and leads to major traffic congestion in the town and are not included in modes used by general population.

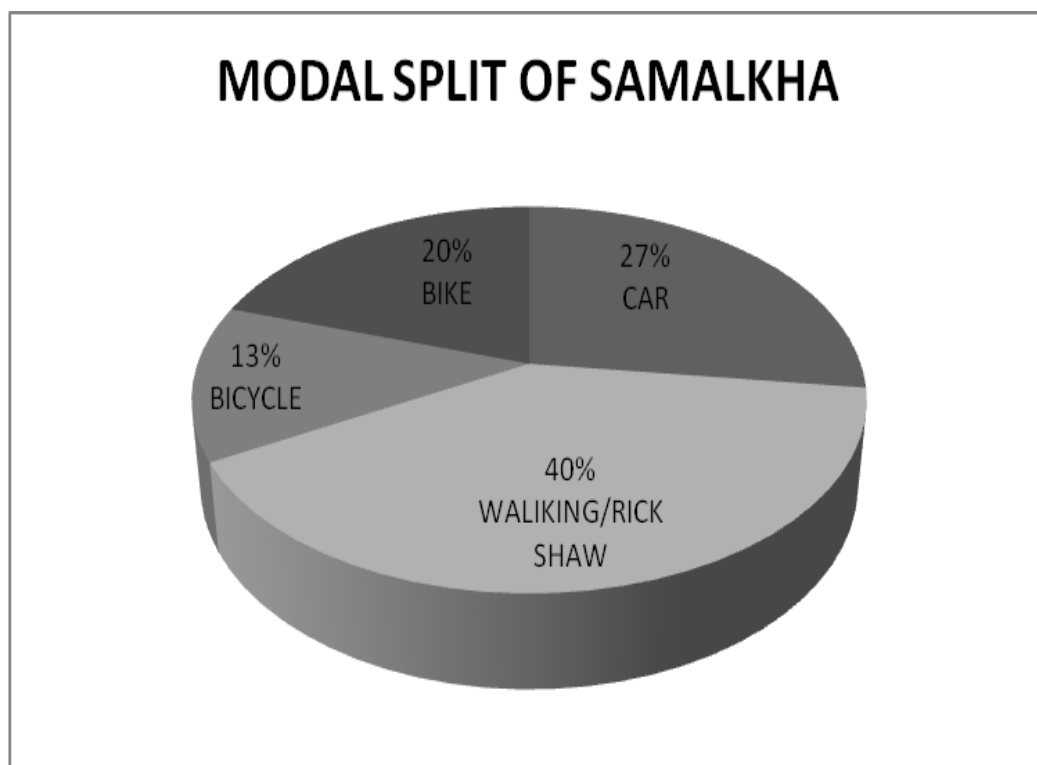


Figure 1: Modal split of Samalkha town

CONGESTION MEASUREMENT

These are the five most common measures for mobility/congestion:

Volume-to-Capacity Ratio (V/C Ratio)

If the ratio of volume to the capacity is greater than or equal to 1 then it is said to be highly congested roads. This ratio is used to decide level of service for the roads where volume is often taken to be the 30th yearly highest. The Highway Capacity Manual proposes capacity as:

$$c = C_j * N * f_w * f_{HW} * f_p$$

Where c = capacity (vehicles/h)

C_j = lane capacity under ideal conditions with design speed of j

N = number of lanes

f_w = lane width and lateral clearance factor

f_{HW} = heavy vehicle factor

f_p = driver population factor

The Level of Service (LOS):

Highway holdup is expressed in terms of Level of Service (LOS) as outlined by Transportation analysis Board of the National Academy of sciences within the main road capability Manual (HCM). LOS is selected as “A” free flow “F” extremely engorged. The conditions process the LOS for roadways area unit summarized as shown in Table 1.

Table 1: Relation between LOS and Flow

Level of service (LOS)	FLOW
LOS A	Traffic in free-flow condition
LOS B	1. Moderate free-flow, 2. Slight maneuvering is restricted.
LOS C	1. Speeds nearly free-flow. 2. Freedom of movement and changing lanes restricted.
LOS D	1. Flow increases and speed reduced slightly. 2. Quick increasing in density will limit the maneuver.
LOS E	1. Traffic Operates at or near capacity. 2. Traffic streams with usable gaps absent. 3. Traffic Operations change abruptly, causes queuing.
LOS F	1. Traffic breakdown. 2. No movement of traffic. 3. Demand is greater than capacity

Travel Time Index

It is the ratio of average peak travel time to an off-peak travel time, speed of 96km/hr is considered for freeways. Travel time index of 1.20 means average peak travel times are 20% longer than off-peak travel times. Federal highway administration suggested four techniques of measuring travel time reliability:

(a) Planning time

It is the total travel time, which includes buffer time and is calculated as the 95th percentile travel time).

(b) Planning time index

It is the ratio of the 95th percentile travel time to the ideal travel time.

(c) Buffer time

Buffer time is calculated as the difference between the 95th percentile travel time and the average travel time.

(d) Buffer index

It is the ratio of (difference of 95th percentile travel time and the average travel time) to the average travel time.

Travel Delay

The amount of time lost in congestion while traveling.

Percent of Congested Travel

It is a relative live of the quantity of travel laid low with congestion. It's the quantitative relation of the full vehicle-miles of travel and total vehicle-miles of travel.

CAUSE OF TRAFFIC JAM

Traffic rule violation

Due to traffic police negligence most of the people coming to Samalkha from nearby villages violating the traffic rules most of the times. Almost every person on roads of Samalkha town violates traffic regulation in one way or other which is very alarming. Figure 2 shows how traffic rule vilation cases continuously increasing year wise. Due to this knowledge gap and unwillingness to follow traffic rules people violate traffic rules and that causes a traffic jam.

Data shown in **Figure 2** does not represent a clear picture because of the fact that police personnel deputed on the duty are very much involved in taking bribes from the road user for not imposing a penalty on them.

Lack of Planning of town roads

The roads of Samalkha town are not preplanned and we are suffering from traffic jam as an outcome of unplanned town.

Low road space

Due to unplanned parking and illegal vegetable vendors beside the road, the usable road space becomes very low due to increasing number of vehicles coming on roads in past years. **Figure 3 and Figure 4** represents the changing trend in the registration of vehicles in the state of Haryana. So, with the low road space and an increasing number of registration for vehicles in the state makes it more difficult to overcome space problems in

the state and indirectly affecting Samalkha town. It is common that very few vehicles pass and causes the traffic jam. Due to inadequate space in the Samalkha town, we have very low road space to offer for this huge population as the vegetable market, shopping complexes, and other administrative offices are consuming a huge portion of land and this leads to insufficient travel and parking area. **Figure 5** shows how different category of vehicles occupies road spaces.

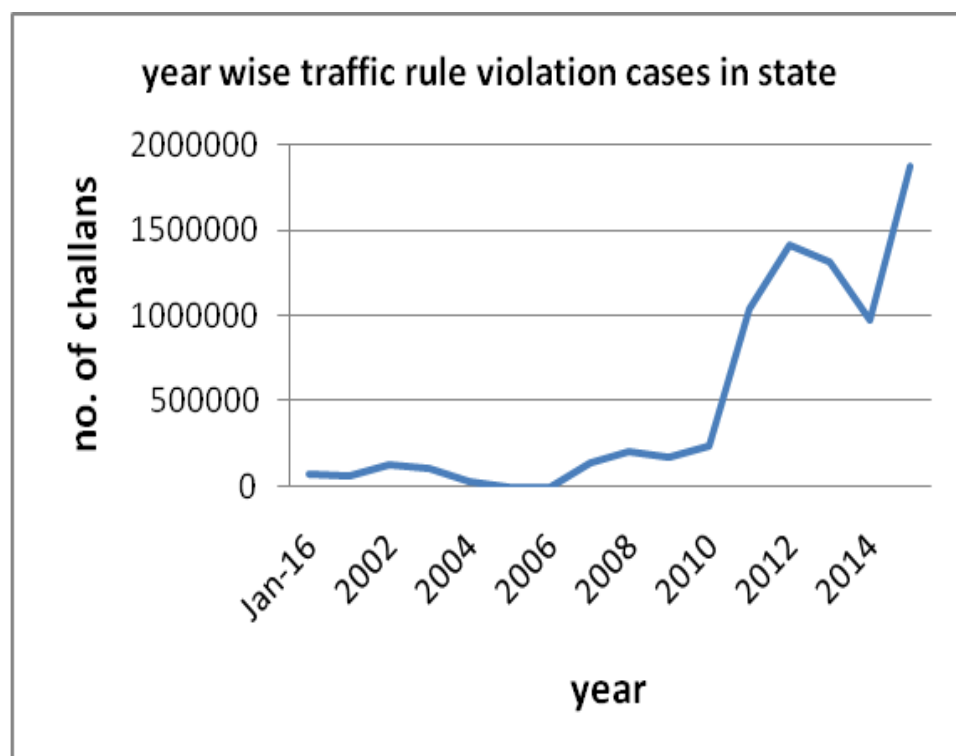


Figure 2: Scenario of traffic rule violation cases in state

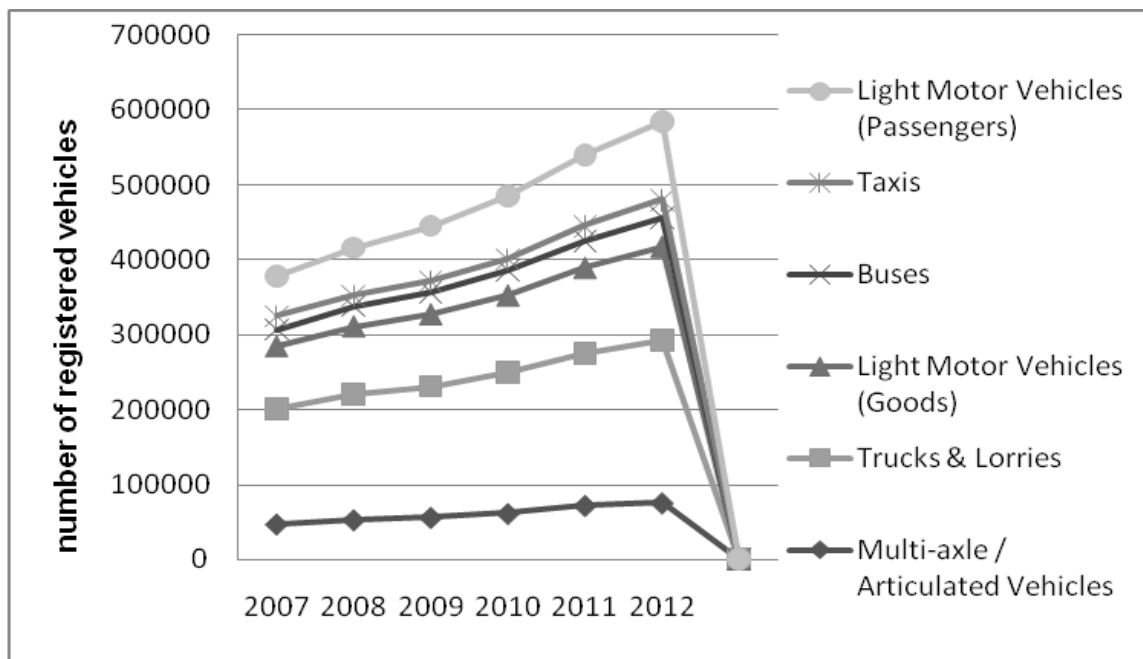


Figure 3: Trend of registration of transport vehicles in the state

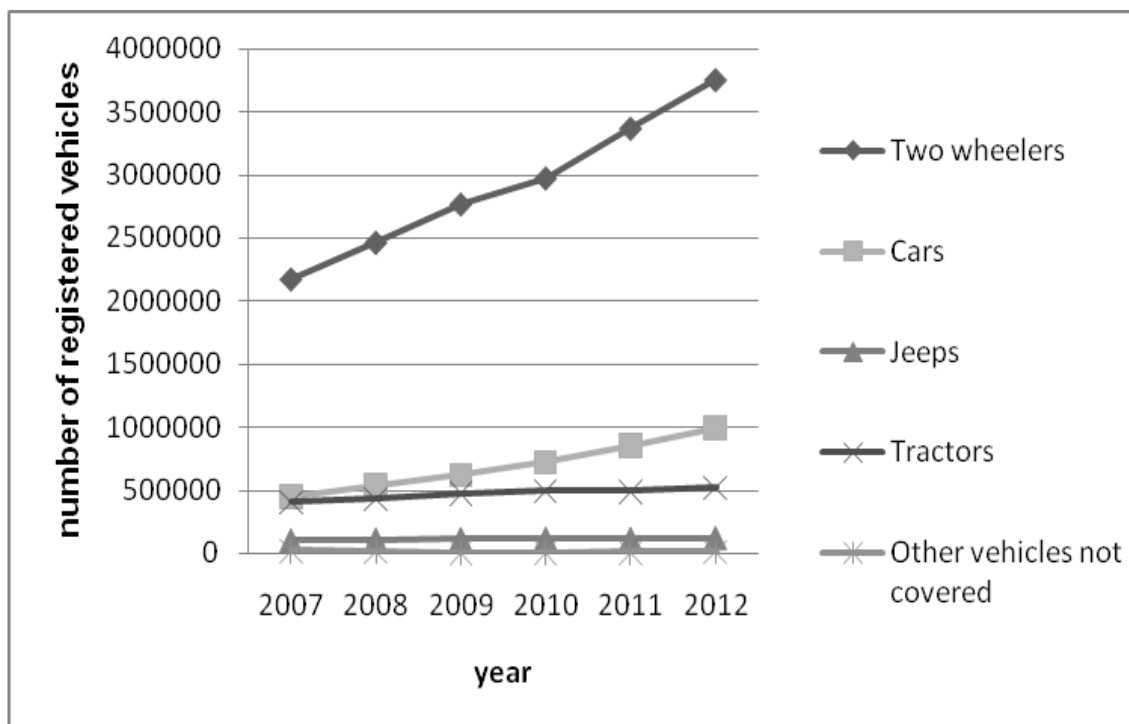


Figure 4: Trend of registration of non-transport vehicles in the state

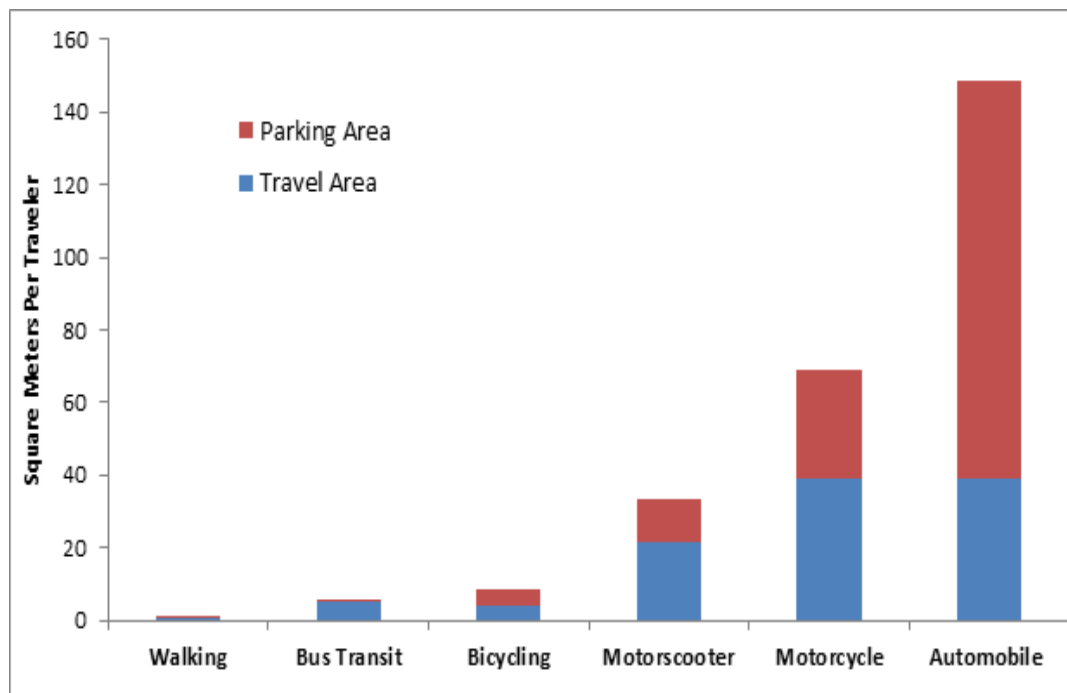


Figure 5: Typical Travel Space Requirements for Various Modes

Unplanned stoppage /parking

We don't have any planned parking facility in Samalkha city. That's why vehicle operators park their vehicles in anywhere and causes the hold up.

Different speed vehicles

As a result, slow moving vehicles are making the fast moving vehicles slow. This is also one of the important reasons of traffic jam in this category heavy loaded vehicles are majorly responsible for the traffic jam in the town which are working for of industries nearby areas.

Increasing population

It is very apparent that due to heavy population coming to Samalkha town

daily for their personal and professional works, traffic is also huge. As, a result enormous traffic load is very common. Figure 6 shows trend in population growth in past few years in Panipat district of Haryana state.

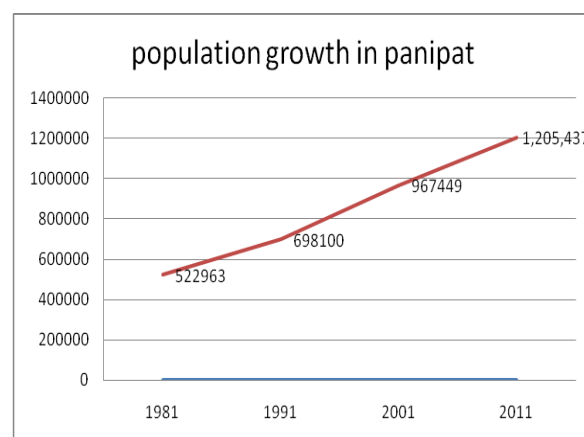


Figure 6: population growth in district of Panipat

Rickshaw

The structure and moving capability of the rickshaw are also responsible for the traffic jam.

Lack of law implementation.

Traffic police are negligent in their work and orders of higher authority are not followed and heavy loaded trucks are not restricted to enter into the main market area is also encouraging road jam and illegal parking.

Private cars

Private car in the roads is also causing the traffic jam. As in one private car, there are only 2/3 people but the car is taking a lot of space. Figure shows how increasing number of cars affect road and responsible for congestion trap in cities.

IMPACT OF TRAFFIC JAM

Impact on economy

Traffic jam has great economic impact on Samalkha town. Due to traffic jam we are losing money in four ways –

Extra transportation cost

If, staying time of drivers in the traffic is less, then definitely the transportation cost will be lower called value of travel time savings. For urban, we do not have any research on VOT in Samalkha.

Extra fuel consumption

Due to traffic jam, extra fuel consumption is a big problem for a developing country like India. The government is buying this extra amount of fuel with hard cash. This is considered a national loss.

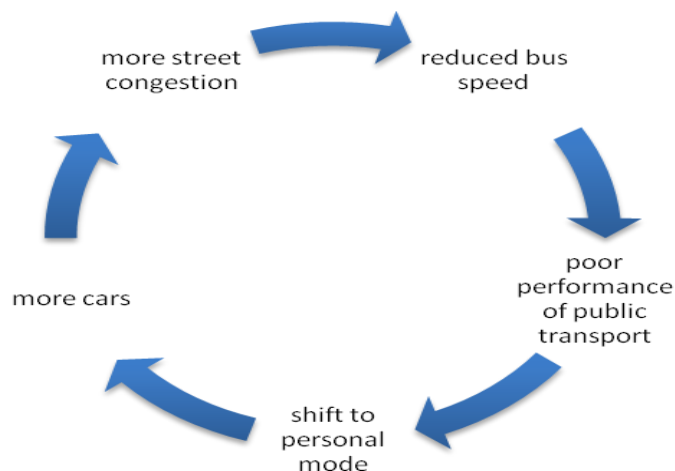


Figure 7: Mapping of congestion cost

Vehicle operating cost

Vehicle operating cost is directly proportionate to the traffic jam. A vehicle operator applies more breaks and accelerates again and again. So, the lifetime of vehicle parts and fuel consumption will be more in road jams. Traffic jam actually increases VOC.

Impact on pollution level

According to the report on (Status of the vehicular pollution control programme in India) released in march 2010 by Central Pollution control Board, Ministry of Environment & Forests, Govt. of India: Vehicular emissions depend on vehicle speed, vehicle-km, age of vehicle, and

emission rate. In general, the average peak hour speed in Indian cities is far less than the optimum one. Growing traffic and limited road space have reduced peak-hour speeds to 5-10 Km/h in the central areas of many major cities. The quantity of all the three major air pollutants (namely, nitrogen oxides, hydrocarbons, and carbon monoxide) drastically increases with reduction in motor vehicle speeds. For example, at a speed of 75 Km/h, emission of carbon monoxides is 6.4 gm/veh.-km, which increases by five times to 33.0 gm/veh.-km at a speed of 10 Km/h. Similarly, emission of other pollutants increases with the reduction in vehicle speed.

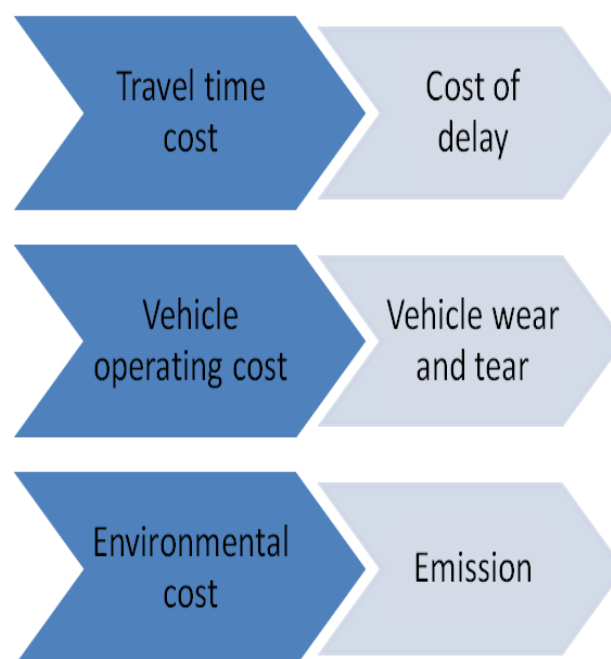


Figure 8: Mapping of congestion cost

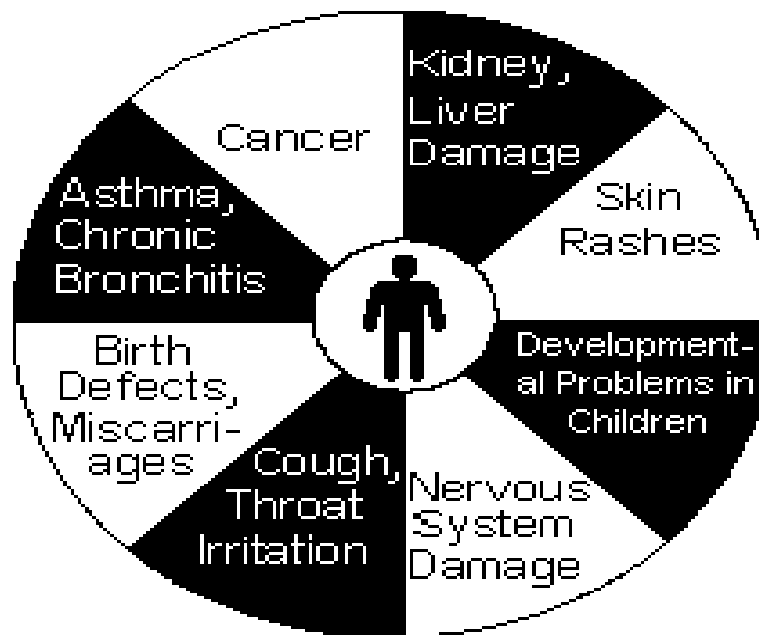


Figure 9: Health concerns of air pollution

Thus, prevalent traffic congestion in Indian cities particularly during peak-hour not only increases the delay but also increases the pollution level. Some major health problems concerned with air

pollution are breathing problems, Headache, Mental stress, Hearing problem, Sweat without any reason, Tiredness, and Eye problem

SOLUTIONS FOR TRAFFIC JAM IN SAMALKHA

Awareness building by training

To reduce traffic congestion in Samalkha town, public awareness plays a vital role. Unless and until people change their perception and start following traffic regulations, whatever rules specified by the concerned authority will not work properly.

Residents following laws with the intention of development of town can

reduce traffic jam in Samalkha town up to great extent. In order to provide training to drivers of motor vehicles, four Institutes of Driving Training and Traffic Research (IDTRs) are being established in the districts of the State such as Rohtak, Bahadurgarh, Bhiwani, Kaithal with a total budget of about 100 Crore Rupees, but few people's approaching to these institutes in state. Table 2 shows charges for training in these institutes is quite low but still not many people coming to these institutions.

Table 2: represents the charges in above mentioned institutes for drivers' training.

COURSE	DURATION	CHARGES IN RUPEES
HMV/LMV- commercial	1 day	400
Hazardous	1 day	400
Hazardous	1 day	400
HMV/LMV-commercial	1 day	400
HMV/LMV	1 day	400
Conductor License	1 day	300
Badge-Training	1 day	300
Skill Test	Half day	350
Competency test	Half day	350

Strict traffic law implementation

Most people think that traffic jam in Samalkha town can be reduced by restricting heavily loaded trucks. It can be done by implementing traffic law strictly. If each and every traffic policeman perform his duty then it will be easy to implement rules.

Increasing pedestrian facilities

As per the survey results, most of the people like to travel on foot for shopping and other administrative works in Samalkha town. On the other hand, the space available for pedestrians must be increased and space available must be freed from vendors occupying the pedestrian spaces. The government should spread awareness and must motivate people to travel on foot in marketplaces,

by providing good pedestrian facilities so that loads on the road could be reduced.

Non - Motorized Transport

Samalkha town is a town of different class vehicles. The non motorized vehicles slow to fast-moving, nothing left on the road of Samalkha. This leads to the problem in handling traffic and provides the same type of rules and regulations for each type of vehicle and will be difficult to control vehicles of all classes on roads of Samalkha. That is why roads must be free from non motorized vehicle up to such an extent that will reduce traffic density on roads.

Maximum use of road width

Banning unauthorized parking, roadside hawkers, illegal advertisement boards can be useful in maximum use of roads.

Control lines must be introduced to restrict the procurement of the road space.

Separate route for heavy loaded traffic

Routes must be separated according to different classes of vehicles, heavily loaded trucks should not be allowed into the main market area and separate route must be specified for these during peak hours.

Car free days

Car free days are a way of awareness among society and are working efficiently in bigger cities like New Delhi and Gurugram. A report released by the Centre for Science and Environment (CSE) suggests that on the first day of a car-free day -there was 60% drop in air pollution and the reasonable reduction in traffic congestion

on that particular day. We can use this strategy here in Samalkha and will be able to reduce jams and air pollution for the short period of time on the weekly basis.

Discourage private cars

A bus can accommodate people as much as provided by many cars and occupy less space on roads. It will be terribly useful to cut back a load on the road by discouraging non-public car. It is possible to discourage people from the private car is very easy in low-income area like Samalkha and ultimately reduce traffic load and congestion. It is clearly represented in (table 3) that road space occupancy of bus is much lower as compared to cars and also the pollution caused by cars is more as compared to bus.

Table 3: Pollution rate and congestion effect of private and public transport vehicles

Type of vehicle	Average passenger / veh.	Pollution load in gm/pass.-km	Congestion effect in PCU/Pass.
Two-stroke two-wheeler petrol engine	2	7.13	0.375
Four-stroke two-wheeler petrol engine	2	4.76	0.375
Car with catalytic converter petrol engine	4	0.93	0.25
Bus with diesel engine	40	1.00	0.075

Source: Transport Policy for Better Air Quality in Urban India (Singh (2008)).

Note: PCU = Passenger Car Unit where 1 car = 1 PCU, 1 bus = 2.5 PCU, 1 scooter = 0.75 PCU, etc.

School/College bus

Each and every day parents of school children came to school and colleges to pick and drop their children and in the mean time they park the vehicle in front of schools and colleges and can cause traffic slowdown in densely populated areas and leads to congestion. There should be bus facilities available at schools and colleges for their students so they will not use their own transport to travel to respective locations and this will directly reduce the traffic loads on roads.

Traffic Impact Assessment

Prior to construction, the plan should be passed from the local administrative body such as the municipal authority of

Samalkha. There should be a peer review of the plan through experts and traffic impact assessment must be done to study the impact of construction nearby area.

Training of traffic policemen

Samalkha town traffic police do not have sufficient human resources in term of policemen. Those available are not well trained and most of the policemen work for continuously 12 hours. So, there must be sufficient human resources to handle large traffic on roads of Samalkha.

Congestion Pricing

Congestion pricing is very well tested solution for traffic congestion. Its main objective is to discourage road users not to use their personal vehicles in low road spaces during peak hours only.

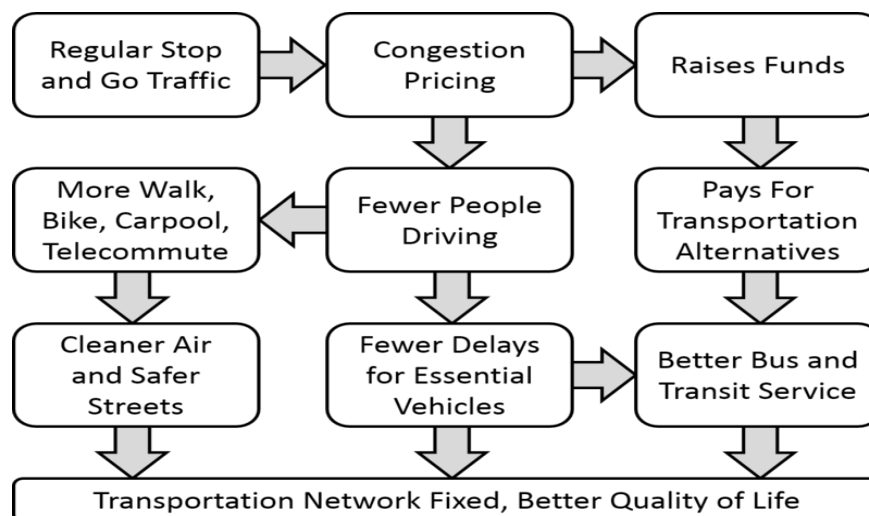


Figure 10: Flowchart describing congestion pricing.

It encourages walking, cycling, and carpool. Also reduce pollution and make roads and streets safe by reducing traffic. This strategy is very well implemented in metropolitan cities such as London and New York and many parts of India. Figure 10 show congestion pricing helps in maintaining better transportation facility and environment as well.

CONCLUSION

In the above discussion we explained how to measure congestion by different methods, also discussed possible causes of congestion and there solutions. We observed that major causes of traffic jam in Samalkha are trespassing of heavy loaded trucks through main road and encroachment of road space by roadside vendors. Also, from personal interviews we conclude that negligence of higher authority and local administration is one of the major factors for condition like this in Samalkha.

Methods for measuring congestion were implemented to condition of Samlkha and a result shows LOS in peak hour as 'F' which is an alarming situation for Samalkha. It is very important for this town to play a vital role in the economy of Haryana state and ultimately to the country. But now due to traffic jam, this

town is causing the major loss in the economy of the state. But on the other hand by reducing traffic jam, it can also bring happy and healthier life for the citizens by ensuring unpolluted environment. To make future generation healthy traffic congestion must be reduced so that pollution can be minimized. Solutions disused above are both long-term and short-term based on the current requirement and present scenario of the town. We need to work on the basis of long- term solutions and on the other hand short term solutions must be implemented to remove present problems. The balance must be maintained so that to implement short-term solution and try to fetch profits from that we must not compromise our future and long term solutions must be implemented as soon as possible. The focus must be on each and every aspect of traffic congestion, economy, and health. We explained major causes and their solutions suggested by local administration, local residents, vehicle operators, and experts to reduce traffic congestion from different aspects. The solutions must be simple and can be easily implemented with the maximum use of resources available.

REFERENCES

- I. Fioravante, E. F., & Fígoli, M. G. B. (2009). Environmental impact due to automobile use. XXVI IUSSP International Population Conference, Morocco.
- II. Prskawetz, A., Leiwen, J., & O'Neill, B. C. (2004). Demographic composition and projections of car use in Austria. Vienna Yearbook of Population Research. Vienna: Austrian Academy of Sciences, Vienna Institute of Demography, 175-201.
- III. Shuichi, M., & Hironao, K. (2003). A Study on the Traffic Impacts in Town Traffic Consideration of the Value of Time about Streetcar. Journal of Nippon Kikai Gakkai Kotsu, Butsuryu Bumon Taikai Koen Ronbunshu (Japan), 12, 403-406.
- IV. YI, Z. (1991). Family dynamics in China: a life table analysis. Wisconsin: The University of Wisconsin Press.
- V. Singh, S.K. (2008). Transport Policy for Better Air Quality in Urban India. In K. N. Bhatt, eds., Population, Environment, and Health: Emerging Issues; pp. 169-184. Rawat Publications, Jaipur, India.