

Introduction to Multimodal Urban Transportation System (MUTS)
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Module No # 01

Lecture No # 02

Overview of urban transportation: Key issues in urban transportation

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Hello friends, welcome back to the next lecture in this series. In this lecture we will look at urban transportation and its key issues. In the previous lecture we looked at urbanization and its relationship to transportation and now we will look at the key issues in urban transportation. Broadly, you can say urban transportation tries to minimize the traffic crashes, tries to deal with congestion and how do you reduce congestion, tries to deal with the issue of environmental impacts and how to minimize them and also tries to provide equity to all the people that are trying to use this system.

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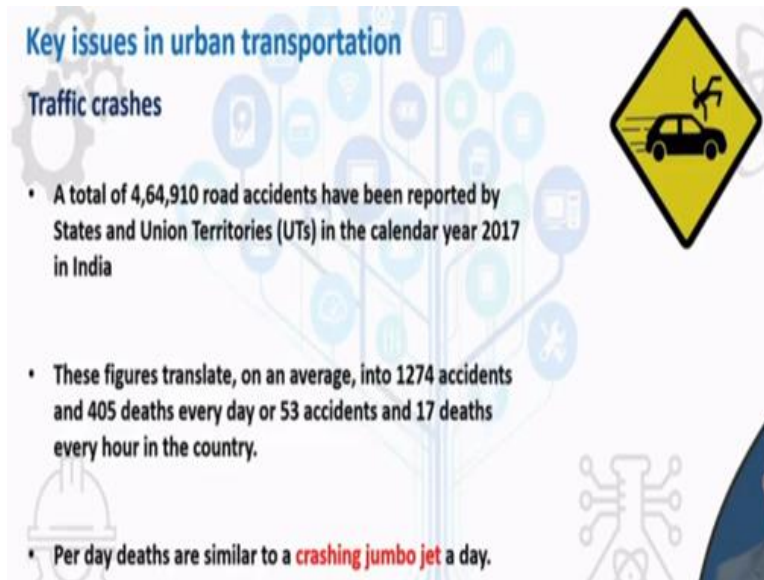
When we look at the first issue in urban transportation, it is invariably the safety of the system. Worldwide, if you look at the chart that is provided here, road traffic injuries are the eighth most reason of death across the world. So when you think of the number of people that are getting killed every day, road traffic injuries are the eighth most dangerous way of getting killed, which otherwise are mostly health reasons.

So traffic injuries now fall in this whole paradigm of safety, of not only looking at it from civil engineering or urban planning point of view, but many of the health professionals are also looking at urban transportation and its impacts on safety. As the number of vehicles increase on the road, fatalities are also increasing. So fatalities are only a segment of the accidents in which people actually pass away or actually die.

But the number of accidents that are occurring are many fold. In an accident, you may only have property damage, such as your car or your motor cycle gets totaled or gets damaged but very little injury happens to you or you do not have a fatality. However, there are serious injuries when there are serious accidents, for e.g. when there are high speed accidents there is lot of fatalities also. So, this is one of the inevitable side effects of the transportation system in India.

We want our roads, we want railways, and we want our buses, but along with them comes the issue of safety.

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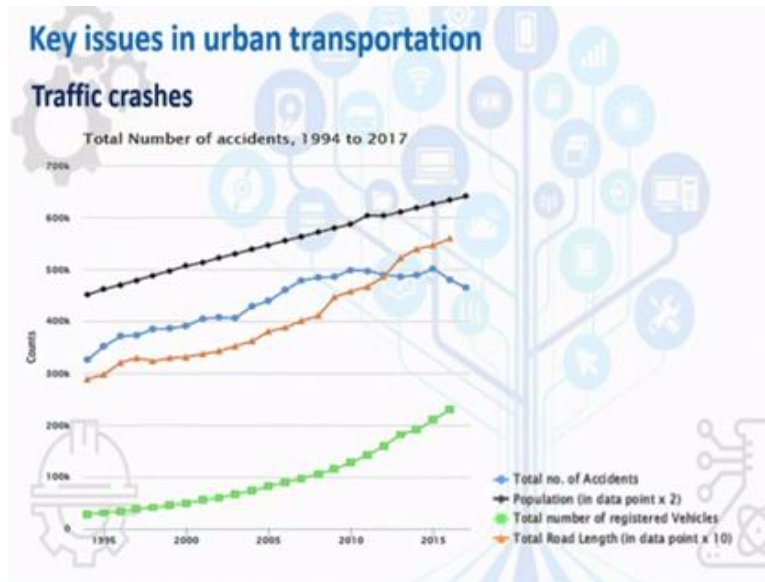


The transportation safety situation in India is equivalent to one jumbo jet, that can carry about 400 passengers in 1 trip, crashing every day. So that is the amount of people that are actually dying on our roads on an average every day. So this is not a monthly figure, this is not a weekly figure, this is on an average everyday there are around 400 people that are actually dying.

So you can see that I mean, the second bullet in the figure says that there are on an average over 1,200 accidents every day and one-third of those accidents, around 400, are leading to actually deaths. So that is a very alarming situation. The situation is alarming especially in the developing countries where motorization has been a very recent phenomenon, or the rate of increase in motorization has been very recent phenomenon.

There are various reasons for these accidents, which we will get in to, and give you an overview of one by one, but it is a serious issue in transportation.

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One of the reasons that has been attributed to the increasing number of accidents is just purely the increasing number of vehicles on the road. If you look at this chart, up to around 2013 or so, in these charts the blue lines and the orange line where running parallel to each other, meaning as the road length increases, so as you lay more and more roads, the number of accidents also kept on increasing.

The green line shows the number of registered vehicles, although the numbers are lesser or the growth pattern is less than the number of lanes laid out, but you can see that they are also parallel to each other. So as more and more are vehicles are getting registered, and more and more road length is being supplied into the system, the number of accidents are also increasing; number of accidents, injuries, everything is kind of increasing.

There has been a recent trend of slow down or there is a decreasing trend in the accidents over the past few years, which is encouraging sign, but the number the actual number is still very high.

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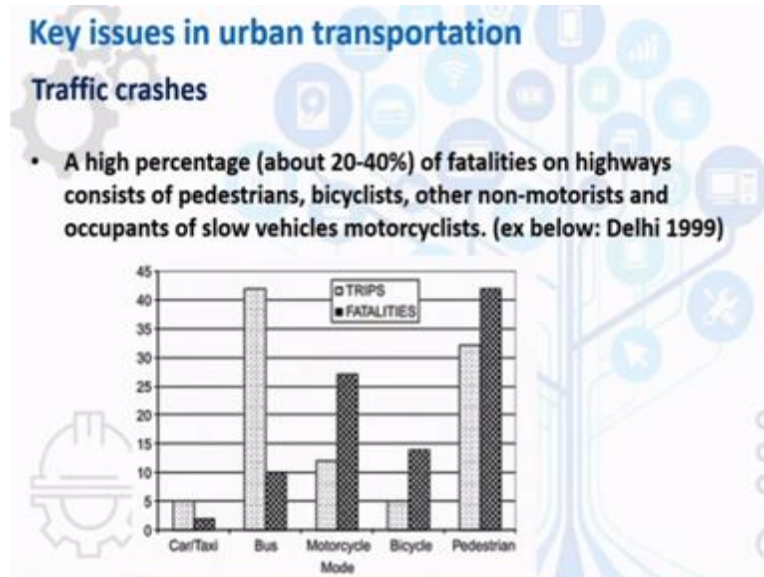
3 primary reasons for accident happening could be grouped under the road issues, the driver issues and the vehicle issues. Road issues meaning the road may not be designed properly, the road may not have proper signs, the road may not be illuminated well, may be the pavement quality is not very good. So there are different issues with the road itself that is contributing to these accidents. On the other hand the drivers on the roads are also contributing largely to the accidents taking place. You are either over speeding, i.e. the driver is either over speeding, the driver is either not wearing the helmet, driver either is drinking under the influence of alcohol. So there may be different such reasons and also especially in our country where license, the driver licensing system, is not very tightly monitored. So once a novice driver is suddenly given a driver's license, he or she may not have proper training in driving which may lead to accidents as well.

So all of these factors are can be grouped under the driver factors leading to accidents. Then there is a vehicle itself. We often see crash test ratings that are performed on all the newly incoming cars in our system. You often see that they never get good safety ratings, the way they are designed, the way their air bags are put in, the way their seat belts are designed are always not providing enough safety to the passengers that are in it.

So the design of the vehicle is a problem, and subsequently we do not maintain it; we often redesign a vehicle to fit our needs. One of the prime examples is these school vans or pooled cars that take children to their schools; they are often retrofitted inside to fill more and more kids into

these vans. However, those kind of changes to the design are not often recommended because that is a unsafe practice in changing the design by yourself. So vehicle, driver and the road are three primary issues, or three primary players, which lead to accidents.

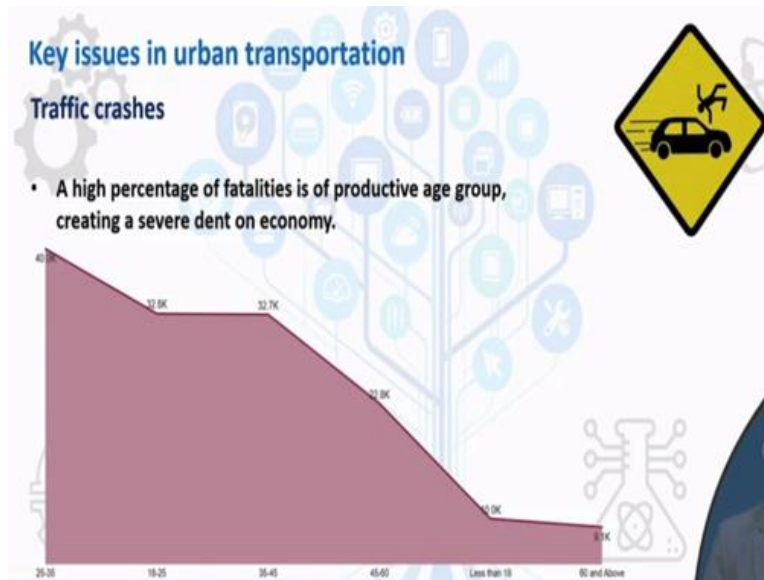
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If you start looking more and more into the statistics of why fatalities are happening, you will see that high percentage of fatalities consists of actually the vulnerable road users. And when we say vulnerable road users, we mean pedestrians, people on bicycles, and people on cycle rickshaws or slow moving vehicles on the road. So, all of these people are majority of the people that are getting killed on the on urban roads as well as highways.

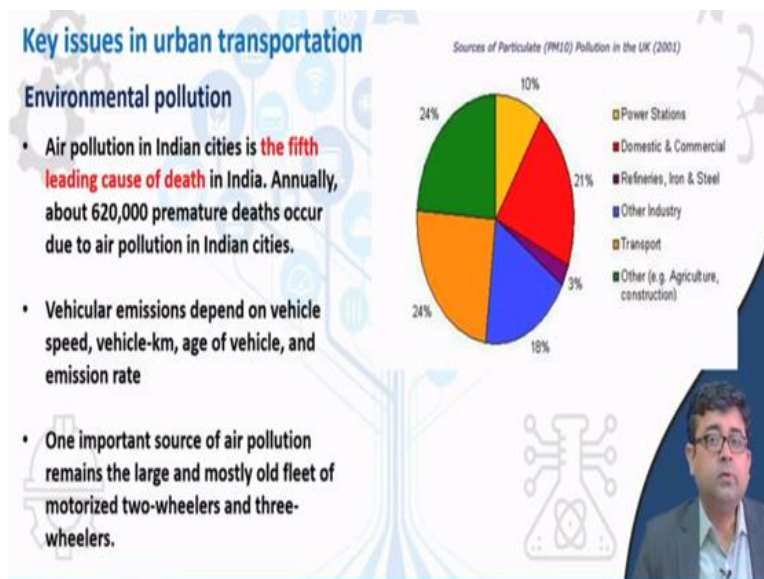
This is one of the primary concerns especially in India because our roads carry different types of vehicles, ours is the very heterogeneous type of transportation system. We are not purely motorized, even though the motorization rate is increasing, but we still have a lot of non-motorized activities and transport modes on our roads.

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The other phenomenon that is being looked at, or is being observed is that the number of people that are getting killed are in the prime of their youth. So when you see that who are getting killed on the roads are usually within the age group of 25 to 45 or 25 to 50. So that is the prime age when you are contributing to your family, and when you are contributing to the economy of the nation. So when somebody in that age group passes away, it not only impacts the family, it impacts the overall GDP growth of the nation. So there is enormous need to improve the safety of people riding on the roads.

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The second issue with transportation is its impact on the environment. As more and more people use motorized modes of transport, especially private motorized modes of transport, for example,

the 2 wheeler and 4 wheeler we have, and if we ride it by ourselves or get driven by our chauffeurs, that is actually increasing the per capita emissions along these roads. If you use motorized public transportation mode, although there are still motorized the per capita emission is lesser.

If you use bicycles you are almost not emitting anything, your carbon footprint is not that great or not that high, and while walking it is even lesser. So there are different modes of transportation that impact the environment differently. However, the most impact is by the motorized modes. You will see in the chart that the orange pie shows you the same, this is an example from UK, so this is not only a problem in India, it is a problem in developed countries as well because the developed countries have even fewer non-motorized modes of transport.

In the developed nations, practically everybody is using the motorized modes. And so the problem there is manifold than what it is in India. So we still have a chance to arrest the situation and reverse the trend of environmental emission from motorized vehicles. So the chart is an example of the particulate matter PM 10, as a result of transport activities in the UK. You would see PM 10 is emitted by various other sources such as power stations, residential commercial uses, but transport is almost 25% of the share.

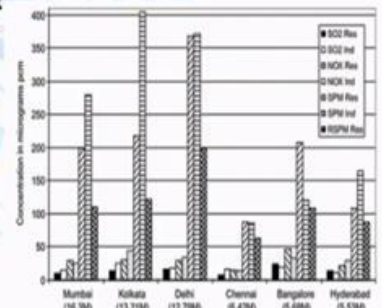
So, we have to be very cognizant of this fact when we are looking at urban motorized transportation modes.

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Key issues in urban transportation

Environmental pollution

- The transport sector contributes about **20% of CO₂ emissions worldwide** and about 15% of CO₂ emissions in India
- Noise, air, and water pollution are all serious problems in Indian cities, and transport sources contribute to all three kinds.
- India's three largest cities, SPM and RSPM levels are three to four times higher than the WHO's maximum acceptable levels



Even in India, the different chart shows different cities and the pollution that is emitted by transport modes. Of almost 20% of the carbon dioxide emissions worldwide and about 15% of the carbon dioxide emissions in India, comes from the transportation sector. Noise and water pollution are other serious issues that are associated with transportation sources. So as the motorization rate increases in the urban cities or other metropolitan cities in India, the emission problem is also getting worse.

Along with greenhouse gases emissions, another cause of concern is particulate matter. So the dust, the fine dust that gets into the atmosphere because of the movement of the vehicles that causes serious respiratory issues. So it is not only the greenhouse gas emissions that is a problem. It is also the suspended particulate matter that is an issue in the case of transportation emissions.

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Key issues in urban transportation

Environmental pollution

- Most of the recent progress in reducing air pollution has resulted from the regulations requiring cleaner fuels.
- With new technologies like plug in hybrid vehicles, electric vehicles, etc. pollution is expected to reduce.
- With technologies like autonomous vehicle, the speed of vehicles and utilization of fleet is expected to optimize; thereby reducing the vehicles.



Source: www.uperin.edu

That is one of the primary reasons why we are all looking at moving towards cleaner technologies for transportation. Electric vehicles is one such thing that is gaining a lot of popularity now. We have also tested cleaner fuels such as CNG, etc. to power our vehicles. So if your cities are adopting such cleaner technologies, we should welcome it and we should move towards developing a system where electric vehicles can be can be incorporated into our network so as to reduce the pollution not only along the roads but also along in the cities. We have to make sure that when the electric vehicles are powered, the electricity that is coming should not be coming from a thermal power source, which uses coal, which in turn just shifts the air pollution from the roads to the thermal power plant areas. So renewable energy sources should be utilized, electric vehicle should be introduced, and these all new fuel technologies should be encouraged to arrest the situation of negative impacts on the environment by transportation modes.

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Key issues in urban transportation

Roadway congestion

- Traffic congestion is probably the most visible, most pervasive, and most immediate transport problem plaguing India's cities on a daily basis.
- Traffic congestion is frustrating and time consuming for travelers.
- For example, In Delhi, the average vehicular speed fell from 20–27 km/h in 1997 to only 15 km/h in 2002



Source: www.worldnomads.com

Roadway congestion, which we have briefly looked at, also adds to increased emissions. If you look at some statistics, which are startling especially in New Delhi, the average speed which used to be somewhere around 20 to 25 kilometers per hour has fallen to almost 15 kilometers per hour. So now, everybody crawls on those roads, and if you are moving at a very low speed for a long period of time, you are also emitting a lot of greenhouse gases as you are moving.

So, traffic congestion is not only causing delay in your travel time, which is an inconvenience to you, but it is also significantly contributing to emissions. So congestion, like we said is a byproduct of supply not keeping up with demand, and that in turn causes also a lot of emissions.

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Key issues in urban transportation

Roadway congestion

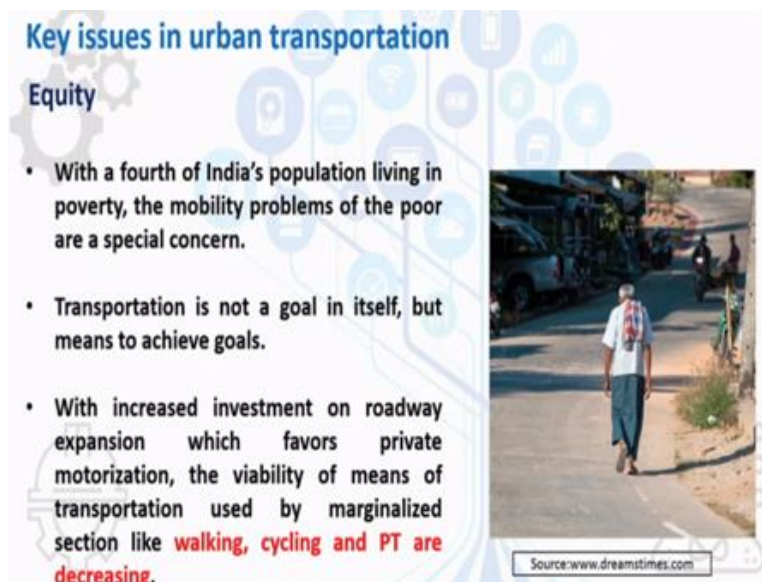
- The increase in the number of private vehicles plying on roads is one of the major reasons for traffic congestion in the cities
- According to (TCI & IIM Calcutta, 2014), the cost of delay in India is **6.6 Billion USD per year**; and the cost of additional fuel consumption due to delay is **14.7 Billion USD per year**.



Since transportation is directly related to economy, there are studies that are showing that this congestion is actually hurting the economy directly. So, one of the studies shows that the cost of delay in India is almost around 6.6 billion US Dollars per year, looking at it in terms of money. Because your time is wasted in congestion which could have been put to proper use, which could have put to productive uses, now you are stuck in traffic doing no productive work.

So that productive work can be converted into a monetary terms and if you cumulatively look at how many hours of delays are there along each road in each city, you will see that the number is very huge; 6.6 billion is an estimate of that delay.

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Key issues in urban transportation

Equity

- With a fourth of India's population living in poverty, the mobility problems of the poor are a special concern.
- Transportation is not a goal in itself, but means to achieve goals.
- With increased investment on roadway expansion which favors private motorization, the viability of means of transportation used by marginalized section like walking, cycling and PT are decreasing.

Source: www.dreamstimes.com

Equity is another issue; as we provide for more and more transportation investment, they are not being equitably distributed for all parts of the society. The people who use motorized vehicles are benefiting from it but at the same time they are also emitting a lot of emissions and may be getting into accidents. So equity here means that it has to be equal benefits for all the people residing in the city. It has to benefit everybody and every mode of transport.

One of the big criticisms of metro systems in the cities is that although they are mass transportation systems, i.e. it is for the masses, but it is hardly utilized by people of the low income groups. They feel, they seem to think, that the big shiny metro rails are not for us, so they still stick to the buses, which seems friendlier to them, more approachable, more accessible to them rather than the metro systems.

Whereas metro systems are designed for the common masses but the masses are not utilizing them. So it shows that investment and equity are not going hand in hand, so more and more investments should be directed towards the people of lower socioeconomic groups.

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Key issues in urban transportation

Equity

- The already extreme inequity in mobility and accessibility in Indian society will probably get even worse.
- Not only will the poor benefit least from increasing motorization, but they will bear a disproportionate share of the social and environmental costs of that motorization.
- For example, most fatalities in crashes involve pedestrians and cyclist, who usually are poor people who cannot afford private vehicles and sometimes even low fare of PT

This gives you further example of the things that I was just discussing.

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CONCLUSION

- Traffic crashes is a major problem in urban India responsible for loss of life and economy.
- Pollution from vehicular emission accounts for a major share in overall environmental pollution
- Transportation affects equity and it is even more important for developing country like India

So in conclusion, we looked at some of the issues in transportation or urban transportation in India. Looking at it from the point of view of crashes, emissions, equity and congestion. Thank you very much for your attention.