Low cost means of Transport in Cities: The critical element in city transport system in Low Income Countries

Geetam Tiwari
Transportation Research and Injury Prevention programme (TRIPP)
Indian Institute of Technology, Delhi 110016, India

ABSTRACT: A well functioning road infrastructure must fulfill the requirements of all road users. In the context of the present socio-economic realities of most developing countries, pedestrians, bicyclists and other slow moving vehicles cannot be eliminated from the urban landscape. Pedestrians, bicyclists and non-motorised rickshaws are the most critical elements in mixed traffic. If the infrastructure design does not meet the requirements of these elements all modes of transport operate in sub-optimal conditions. The needs of pedestrians may have been ignored in the conventional planning strategies and has been assigned lower importance compared to other vehicles present on the road. However, the experience from environments where 'captive pedestrians' are present makes a very strong case for rethinking conventional hierarchy of road users. The paper illustrates the critical role played by the low cost means of transport-walking, bicycling, rickshaws etc. in making the city transport system efficient and sustainable based on case studies of Indian cities.

RESUME: une infrastructure routière qui fonctionne bien doit satisfaire aux besoins des usagers. Dans le contexte des conditions socio-économiques actuelles de la plupart des pays en voie de développement, les piétons, les cyclistes et les autres modes de transport lents ne peuvent être éliminés du paysage urbain. Les piétons, les cyclistes et les rickshaws non motorisés sont les éléments les plus critiques d'un trafic très mélangé. Si la conception de l'infrastructure routière ne répond pas aux besoins de ces modes de transport, alors c'est l'ensemble des modes qui opère dans des conditions non optimales. Les besoins des piétons ont pu être ignorés dans les stratégies de transport conventionnelles, et se sont vu affecter une priorité inférieure à celles des véhicules présents sur la route. Cependant, l'expérience d'environnements où l'on trouve des « piétons captifs » plaide fortement en faveur d'une nouvelle conception de la hiérarchie des usagers de la route. Cet exposé, basé sur des études de cas de villes indiennes, illustre le rôle déterminant joué par les moyens de transport à faible coût, comme la marche à pied, la bicyclette, les risckshaws, etc.. dans l'établissement d'un système de transport efficace et durable

1 INTRODUCTION

Urban transport in Indian cities is heterogeneous, reflecting the heterogeneity in the socio-economic and landuse patterns. It is dominated by walking trips, non-motorized modes such as bicycles and rickshas, and depending on the size of the city, motorized paratransit and public transport. Generally, in all cities, two wheelers have been growing at a rate of 15–20%per year. Cars have been growing at a rate of 10–15%per year. Up to 80% of the registered vehicles are motorized two-wheelers (MTWs). Cars account for 5–20% of the total vehicle fleet (RITES 1998).

Characteristics of urban transport in Indian cities changes with the city size. Share of motorised trips increase with city size as shown in Table 1., however, low cost modes which includes walking, nonmotorised rickshaws and cycles continue to play an important role. Share of walk trips ranges from 37% in a city of 100,000 population to 28% in megacities with a population of 10 million. Share of cycles and other non-motorised vehicles reduce with increase in city size, however, since each public transport trip involves at least two walking trips importance of non-motorised trips remains in all cities. Low cost trips including public transport trips range from 65% to 82%.

This pattern is not expected to change significantly in the near future as evident from travel data from Delhi. If Delhi with highest number of private vehicle ownership (cars and two wheelers) has 82% trips by low cost modes, dependence on low cost modes will remain much higher in other cities despite growth in private vehicles.

2 CAPTIVE USERS

Indian cities are also characterised by the presence of urban slums. The city growth is almost always accompanied with the expanding size of the urban 'informal economy'. The slums are usually temporary housing structures and basic physical and social services are not available to people living in these structures. Most of the slum dwellers work in the informal sector as domestic workers, petty hawkers, daily wage earners, labourers in small industrial units and construction sector. Their incomes are low partly because of their low educational and skill levels and partly because of the unorganised nature of their trade (Wadhwa 2000) Larger cities have more slums and squatter settlements. In the million plus and megacities of India, 40-50% of the population lives in these informal housing (Misra 1998).

Table 1 Modal Share in Different City Size(RITES 1998)

City size	walk	Public Trans port	Three Wheel Taxi	Rick-shaw	Cars	MTW	Cycle
A	37	10	7	13	2	15	16
B	38	14	6	11	2	20	14
C	31	18	6	8	7	20	11
D	30	22	4	6	2	28	8
E	29	30	4	2	4	21	11
F	29	44	2	3	4	10	7

City size = A: 0.1-0.5, B: 0.5-1 , C: 1-2, E: 2-5, F: above 5 million population
MTW: Motorised two wheeler

The rising cost of transport within the city and long working hours force the workers to live in proximity to their work place. A large number of people living in these units are employed in the informal sector, providing various services to the outer areas of the city where the new developments had been planned. The growth rate of the squatter households, as compared to that for the non-squatters, is nearly four times higher in Delhi– we see a 54.2% growth in squatter households compared to 12.3% in non-squatter households (Hazards Centre 2000). Recent estimates show that about 77% of the entire population in Delhi (more than 10 million people) is living in marginal/sub-standard settlements. It is also well known that the socio-economic and the environmental conditions in these settlements are dismal, but only 50% of the housing stock were allotted to them till 1986 (Hazard Centre, 2000).

A socio-economic survey of the people living in these settlements revealed that over two-thirds of the households had small families, lived in substandard housing, and did not have access to municipal water supply or sewerage facilities. The majority of the workers were in service jobs and as daily laborers earned less than Rs. 2000 per month (US$45), and traveled by foot or bicycle. About 75% of the workers were in “temporary” jobs and about 56% were “unskilled” (Hazard Centre, 2000). This section of the urban population is captive user of low cot modes, i.e., walking and bicycles, because many of these residents cannot afford to pay even the low subsidized fares for buses. Consider that a single one-way bus fare for people living on the outskirts of the city is $0.20– $0.25 (Rs.8–Rs.10), depending on the number of transfers. For the poorest 28% of households with monthly incomes of less than Rs. 2000, about US$40, a single worker would spend 25% or more of their entire monthly income on daily round trip bus fares. For those with incomes much less than Rs 2000, the already-low bus fare is prohibitively expensive.

In Delhi, pedestrians, bicyclists and MTWs constitute 75% of the total fatalities in road traffic crashes (Delhi Traffic Police 2000). Because bicyclists and pedestrians continue to share the road space in the absence of infrastructure specifically designed for NMVs, they are exposed to higher risks of being involved in a road traffic accident by sharing the road space with high-speed modes. Traffic fatalities in Delhi from 1990 to 1999 (Delhi Traffic Police 2000) shows pedestrians constitutes the largest shares ranging from 38% to 46% of the total fatalities. The most alarming trend is that this share has been increasing over the years compared to other victims who have either remained constant or show declining trend...The effect of high risk involved in walking, and bicycling is evident in travel patterns of different socio-economic groups in the city.Travel patterns of people living in informal housing or slums are very different from residents of formal housing (Table 2). Bicycles and walking accounts for 66% of the commuting trips for the former, whereas the latter are dependent on buses , cars and two wheelers. Bicycles and walking trips are negligible. This implies that despite high risks and hostile infrastructure, low cost modes exist because users of these modes do not have any choice, they are the 'captive' users of low cost modes.

Table 2 Commuting patterns of high and low income households in Delhi (1999)

	High income households[a]	Low income house-holds[b]
Cycle	3	39
Bus	36	32
Car	28	0
SC/MC	29	3
Auto	2	1
Rail		2
Others		2.
Walk	2	22
Total	100	100

[a] IIT survey of high and middle income households (average income Rs. 7000/month).

[b]IIT survey of low income households (average income Rs. 2000/month).

3 TRANSPORT INFRASTRUCTURE

Infrastructure planning and policies in the city have clearly ignored the existence of this population, and this is most evident in the transport infrastructure and transport policies of the city. The existing road design does not cater to the needs of pedestrians, bicycles, or any other slow moving traffic. Service roads if present are not maintained well. Footpaths are either not present or poorly maintained. There are no specific facilities provided for buses also, except locating bus shelters. Approach to bus shelters, bus priority lanes, continuous pedestrian paths, lane for slow vehicles like bicycles and rickshaws etc. have not been included in the road network designs. Consequently all road users have to share the carriageway. This often leads to unsafe conditions for pedestrians and slow moving vehicles and congested conditions for motorised vehicles. The per capita availability of road in Delhi in 1997 was 2.6 meters per person. It must also be noted that almost 66% of the vehicular fleet in Delhi consists of motorised two wheelers which take up less road space than cars and buses. Despite this, average speeds have been reducing over the years. Peak hour traffic on arterial roads crawls through bottlenecks at major intersections. In general, most arterial roads are six lanes divided roads; however, the extensive road network has not been developed to serve the mixed traffic present on the roads. Infrastructure for pedestrians and other non-motorised vehicles remains dismal in other cities as well. There is no continuity of the available footpath. These are frequently interrupted to provide access to properties abutting the roads. Encroachment on footpaths varies from 25% to 35% in most cities (RITES 1998).

Delhi has an extensive road network with a total length of 26, 582 km (year 1996–97) of which approx. 1148 km has a right-of-way 30 m and above. Nearly 500 km of these roads already exist, and the remaining 852 km is proposed in new developments. In general, most arterials are sixlane divided roads. The Ring Road and the Outer Ring Road are the most important arterials. Average speeds have been reducing over the years. Peak hour traffic on arterial roads crawls through bottlenecks at major intersections. However, at non-peak hours, mid-block speeds tend to be much higher, ranging from 50 to 90 km/h for buses and private motorized vehicles, respectively. This leads to higher fatality rates on one hand and on the other, longer waiting periods at junctions. It seems that the problem lies with the poor management of the corridor traffic flow and speeds, resulting in increased levels of congestion at some spots and a few corridors at peak hours. The traffic system does not meet the requirements of pedestrians, bicyclists and bus systems. This is evident in detailed studies of traffic existing on the roads.

Bus commuters and pedestrians and NMV users together form the largest group of road users. Yet their needs for a safe and convenient infrastructure continue to be ignored. In the name of development cities continue to invest in infrastructure that makes the environment for pedestrian even more hostile than at present. At the bus shelters, NMV's using the carriageway are in direct conflict with buses and the approaching commuters. These buses park in platoons of 3 to 6 at an interval of 30 to 60 seconds. Thus for the cyclists, every bus shelter encountered, results in an increase in travel time and in the number of serious conflicts. To avoid an impending conflict at the bus shelter cyclists, either wait for the buses to clear their path or attempt to find their way slowly through a maze of buses and commuters. At many locations the passenger cycle rickshaw is one of the most important components of the commuting chain. The rickshaws ferry, passengers to and from the bus shelter, saving their walking trips. Currently the contribution of the passenger cycle rickshaw to the transportation system of the city is not recognized and thus no provision has been made for their parking at the bus shelters, forcing them to occupy the carriageway.

4 THE "CRITICAL" ELEMENT IN CITY TRANSPORT SYSTEMS

Meeting the specific needs of the most vulnerable groups in the city becomes crucial for the efficient performance of all traffic. For low-income people commuting to work, walking, bicycling or affordable public transport are not a matter of choice but a necessity for survival. Therefore, whether the roads have any specific facilities for these modes or not, they continue to be used by them. Delhi traffic laws do not segregate bicycle traffic and enforcement of speed limits is minimal. Motor vehicles (MVs) and non-motorized vehicle (NMVs) have different densities at peak traffic hours at different locations in the city. The existing traffic characteristics, modal mix, location details, geometric design, landuse characteristics, and other operating characteristics present a unique situation where economic and travel demand compulsions have overwhelmed the official plans.

On the two and three lane roads, bicycles primarily use the outermost lane on the left, i.e. curbside lane, and MVs do not use the left most lanes even at low bicycle densities. Bicyclists use the middle lanes only when they have to turn right. Even at one-lane sites, the bicyclists occupy the left extreme, giving space to the motorized vehicular traffic. A study of fourteen locations in Delhi shows that maximum mixing of NMVs and MVs occurs at the bus stops. (Tiwari 1998). Their interaction with other MVs is minimal at other locations. On three lane roads, the MV flow rates are close to or less than 4000 passenger car units per hour. This is much less than the expected capacity of three lane roads. The flow for these urban locations can be taken as 2000 passenger car units per hour per lane (Indian Road Congress 1999). Though the peak volumes are not exceeding saturation capacities, we find the average speed remains in the range of 14–39 km/h. This shows that the left most lane (in India traffic keeps to left) is only partially used. However, if this space were exclusively available for bicyclists, throughput would increase because the MV traffic lane is 3.5 m wide and it can accommodate flow rates of at least 6000 bicycles per hour (Replogle 1991).

On two lanes roads, the MV flow rates are close to or less than saturation values. It is only on the one lane roads that we find flow rates of 726 bicycles/h and 616 PCU/h. Both these values are approximately one third of their respective saturation capacity values for one lane. Though de facto segregation takes place on two and three lane roads, an unacceptable danger exists to bicyclists because of impact with MVs. At two- and three-lane locations, it is a waste of resources not to provide a separate bicycle lane because bicycles, irrespective of bicycle density, occupy one whole MV lane.

Our data show that bicycle fatalities on two and three lane roads are relatively high when traffic volumes are low but conflicts between MVs and NMVs have little correlation whatsoever with fatalities during peak flows. In these locations of "integrated" traffic on two and three lane roads, fatalities during peak hours are low but not eliminated. On the other hand, during non-peak hours vehicles travelling at speeds around 50 km/h or greater kill a large number of bicyclists (Tiwari 1998).

Since bicycles and other non-motorized vehicles use the left side of the road, buses are unable to use the designated bus lanes and are forced to stop in the middle lane at bus stops. This disrupts the smooth flow of traffic in all lanes and makes bicycling more hazardous. Motorized traffic does not use the curbside lane even when bicycle densities are low. Providing a separate bicycle track would make more space available for motorized modes and bicycling less hazardous.

4.1 *Infrastructure for buses*

Public transport buses are the major mode of transport in Delhi. Approximately 10,000 buses carry 6 million commuters along 600 routes everyday. However, the road design, traffic signals, and traffic management policies are not specifically designed for bus transport. The design and location of the bus shelter itself does not meet the commuters' requirements of providing convenient interchange between bus routes and spaces for hawkers. Therefore, often bus stops and bus shelters result in a major conflict zone between commuters and moving buses while hawkers "encroach upon" the carriage-way, and bicycles and other slow moving vehicles occupy the designated bus stops.

4.2 *Roadside vendors and services for road users*

Bicycles, pedestrians and bus traffic attract street vendors. Often people selling food, drinks and other articles, which are demanded by these road users, occupy the side roads and pedestrian paths. Vendors often locate themselves at places that are natural markets for them. A careful analysis of location of vendors, number of vendors at each location and type of services provided them shows the need of that environment, since they work under completely "free market" principles. If the services provided by them were not required at those locations, then they would have no incentive to continue staying there. However, road authorities and city authorities view their existence as illegal. Often the argument is given that the presence of street vendors and hawkers reduces road capacity. If we apply the same principle that is applied for the design of road environment for motorized traffic (especially private cars), then vendors have a valid and legal place in the road environment. Highway design manuals recommend frequency and design of service area for motorized vehicles. Street vendors and hawkers serve the same function for pedestrians, bicyclists and bus users. As long as our urban roads are used by these modes, street vendors will remain inevitable and necessary.

It is possible to redesign roads to meet the needs of diverse modes existing in Indian cities. This requires not only altering road geometry and traffic management policies but also legitimizing the services provided by the informal sector. The road network has to be designed from the perspective of the pedestrians, bicyclists and public transport vehicles. If the infrastructure designs do not meet the convenience of these users, they are forced to use facilities that are not designed for them, and all users are forced to operate under sub-optimal conditions.

A segregated bicycle lane needs 2.5m space in Delhi, and this would be used by rickshaws also. Since most of the major arterials in Delhi as well as other Indian cities where planned development has taken place after 1960s, have a service road, the existing road space is wide enough to accommodate a bicycle track. This would not require additional rights of way for the road. A detailed study completed in Delhi shows how existing roads can be redesigned within the given right of way to provide for an exclusive lane for NMVs (bicycles and three wheeled rickshas), a separate pedestrian path, service road and a dedicated bus lane (Tiwari 1998).

5 ESTIMATED MODAL SHIFTS AFTER INVESTMENT IN NMV FRIENDLY /PUBLIC TRANSPORT/ INFRASTRUCTURE

The guiding principle of the proposed design is to meet the needs of pedestrians and bicyclists in terms of convenience, safety, and comfort. This enables the existing space to be reorganised for giving priority to public transport-exclusive bus lanes, better designed bus shelters, spaces for vendors, and rickshа parking. These designs benefit all road users. Since Delhi has an extensive network of arterial roads which have wide right of way (30 m to 90 m) , these offer the opportunity of developing a physically segregated network. Other narrow streets, primarily residential and collector roads have to become NMV friendly with the help of traffic calming devices. If public transport/NMV friendly infrastructure is developed in the city, following change may occur in the use of different vehicle use. Estimated Modal Change

5-1 Estimated modal change

1. Short bus trips (1-6 kms) these will be primarily younger age group (15-24years) will include school trips and leisure trips of children and young adults. Short bus trips of working adults (24-60 years) can also be targeted for substitution. Shift from bus trips will generate capacity in the present overloaded bus system. It may not reduce demand for number of buses, in fact comfortable conditions in buses may make public transport attractive to two wheeler riders and few long trips (16-25kms) of two wheelers may move to buses. Therefore this will result in higher share of bicycle trips (from 2.75% to 5%), reduced share of motorised two wheeler trips (from 29% to 25%) and marginally higher share of bus trips (36% to 37%) .
2. Short car trips (1-6km) of children and adults can also be targeted as in 1. If 1/3 of short car trips are replaced by bicycles, there will be an increase of 1.68% bicycle trips, i.e from 5% to 6.68%., car trips will reduce to 26.6%.
3. Short motorised two wheeler trips say 1/3 of short trips (1-6kms) will shift to bicycles increasing bicycle share by 2.5% from 6.68% to 9.18%. Motorised two wheeler trips will reduce to 22.5%.

4. Pedestrian trips more than 1km in length of all age groups and all income groups. This will result in marginal increase of bicycle trips because majority of the pedestrian trips are less than 1 kms. long.

Table 3 shows estimated change in modal shares of Delhi residents excluding people living in slums and informal housing. Table 4 shows estimated change in modal shares of Delhi residents including informal housing residents when 50% of the population resides in informal housing. The estimated modal shares indicate the reduction in car and two wheeler traffic and increase in bicycles and pedestrians. Share of buses does not show any significant change, however the bus ride is expected to become more comfortable and convenient. Pedestrians and bicyclists benefit from reduced risks of traffic crashes because of dedicated facilities for them.

6 BENEFITS OF NMV FRIENDLY INFRASTRUCTURE

Table 3 Estimated Change in Modal Share of high income households in Delhi (after investment in NMV infrastructure)

Mode	Present Modal Share (1999) Percent**	Estimated change in modal share Percent
Cycle	3	10
Bus	36	38
Car	28	27
SC/MC	29	23
Auto	2	2
Walk	2	2
Total	100	100

** IIT survey

Table 4: Estimated change in modal shares for total population in Delhi.

	Total trips	Percent share
	In million per day	
Cycle	6	24
Bus	8	35
Car	3	13
SC/MC	3	12
Auto	0	1
Taxi	0	0
Rail	0	1
Others	0	1
Walk	3	12
Total	23	100

6.1 *Increased Capacity*

If a separate segregated lane is constructed for bicycles, the curbside lane which is currently used by bicyclists, becomes available to motorised traffic. This relatively small investment in bicycle lanes can increase the road space for motorised traffic by 50 percent on 3 lane roads. Average occupancy of a car is 1.15 persons (IRC 1999) and bicycle carries one person. This implies that in order to move the same number of people we would need 2.6 times the road area that would be required for bicyclists. Given the fact that there is not much space available to expand existing roads, the future mobility needs and projected trips can only be met by increasing the capacity of the existing road network. This can only be achieved by encouraging modes, which are more efficient in terms of space utilisation. Motorised vehicles benefit because of improved capacity of the road and improvement in speeds. Capacity estimations of a typical arterial road in Delhi (Tiwari 1999) show improvement in corridor capacity by 19-23% by providing an exclusive cycle track. If the full capacity of the corridor is utilised, i.e., provision of a high capacity bus lane in the left most lane can lead to capacity improvement by 56-73% (23,000 to 45,000 passengers/h).

6.2 *Improved speeds*

Improvement in speeds of motorised vehicles will be experienced until the corridor is full to capacity due to realisation of induced demand. Major beneficiaries of speed improvement are buses because curbside lane becomes available to them without interference from slow vehicles. Estimations of time savings experienced by bus commuters, car occupants and two wheeler commuters on a typical arterial corridor in Delhi (Katarzyna 1999) show 48% reduction in time costs due to 50% improvement in bus speeds (from present 15 km/h to 30 km/h) and 30% improvement in car and two wheelers.

6.3 *Reduced congestion*

Congestion has long been recognised as an environmental problem. Other than causing delay, it causes noise and fumes and increases health risks of road users and residents. Delhi as well as other Indian cities have invested in grade separated junctions and flyovers as one of the major congestion relief measure at an average cost of Rs. 100 million to 300 million for each intersection. However, detailed simulation of a major intersection in Delhi show that replanning the junction to include separate NMV lanes and bus priority lane can bring in 80% improvement over the present level of delays. Cost of this measure is 25 times less than the proposed grade-separated junction (Kartik 1998).

6.4 *Increased safety*

By creating segregated bicycle lanes and redesigning intersections, conflicts between motorised traffic and bicyclists can be reduced substantially leading to a sharp decrease in the number of accidents and fatalities for bicyclists and motorised two-wheelers. Safety benefits estimated for a typical arterial in Delhi show 46% reduction in accident costs. This is because segregated facility reduces injury accidents by 40% and fatalities by 50%. (Katarzyna, 1999)

7 CONCLUSION

Since the users of low cost modes-pedestrians, bicyclists and public transport are captive users, their presence on the network is inevitable. If the infrastructure design ignores their needs, and traffic laws restrict their movements, often these users are forced to defy laws and continue to use the road infrastructure exposing themselves to a high risk. Motorised vehicles are forced to operate in sub-optimal conditions despite huge investments in car oriented infrastructure.

If pedestrian friendly paths and a separate segregated lane are constructed for bicycles, the curbside lane, which is currently used by bicyclists becomes available to motorised traffic. This relatively small investment in pedestrian and bicycle friendly infrastructure leads to multiple benefits. Motorised vehicles benefit because of improved capacity of the road and improvement in speeds. Major beneficiaries of speed improvement are buses and two wheelers because curbside lane becomes available to them without interference from pedestrians and slow vehicles. It is clear that returns on limited resources which are space and finances in most cities can be maximised by allocating highest priority to the needs of pedestrians, bicyclists and public transport users in that order. This requires not only redesigning roads but also legitimising services needed by these road users which are provided by hawkers and including their requirements in formal designs.

REFERENCES

Delhi Traffic Police 2000. *Delhi Accident Statistics – 1997–99.* Delhi: Traffic Police,

Hazard Center 2000. *Manual for People's Planning. A View from Below of Problems of Urban Existence in Delhi*. Delhi: Hazard Centre.

Katarzyna Tota 1999. *The Role of Non-Motorized Transport in Sustainable Urban Transport Systems: A Preliminary Analysis of Costs and Benefits of Non-Motorized and Bus Priority Measures on Vikas Marg. Delhi.* Prepared for TERI Delhi.

Misra R.P. 1998. Urban India:Historical Roots and Contemporary Scenario. In *Million Cities of India*, R.P.Misra and K Misra (eds). p 52. Delhi: Sustainable Developoment Foundation .

Replogle, M 1991. *Non-Motorized Vehicles in Asia: Issues and Strategie*s. Washington, DC: The World Bank.

RITES 1998. *Traffic and Transportation Policies and Strategies in Urban Areas in India*. Final Report. Delhi: Ministry of Urban Affairs and Employment, GOI.

Indian Road Congress 1999. *Guidelines for Capacity of Urban Roads in Plain Areas*. New Delhi.: IRC.

Tiwari G. 1999. Planning For Non-Motorized Traffic - A Prerequisite For Sustainable Transport System. *IATSS Research* 23(2): 70-77.

Tiwari, G., et al 1998. *Bicycle Master Plan for Delh*i. Final Report submitted to Transport Department, Delhi Government. Delhi: TRIPP, Indian Institute of Technology.

Kartik, V. 1998. *Comparison of Alternate Measures at AIIMS Intersection.* B.Tech. Thesis. Delhi: Department of Civil Engineering, Indian Institute of Technology.

Wadhwa, K. 2000. How Do We Tackle Slums?. *The Economic Times*. New Delhi, April, 11. p13.