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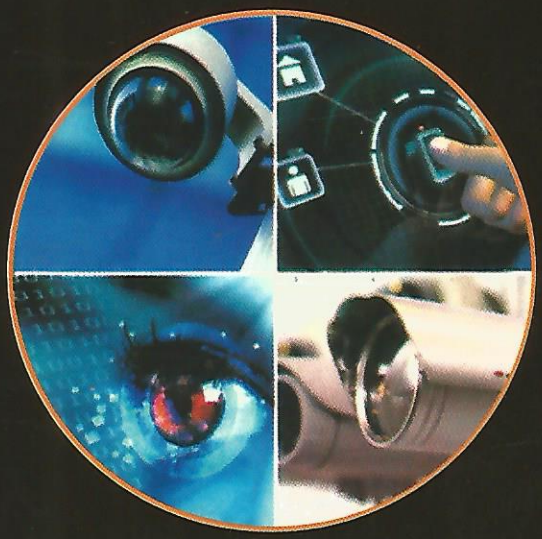

SPECIAL CONFERENCE ISSUE

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INTRODUCTION

The security problem is less well quantified or recognised. It particularly affects pedestrians and cyclists but also affects people in cars and public transport vehicles. In extreme cases, such injuries or deaths of passengers occur in urban road transport. Usually, the acts of personal violence or harassment and assault also occur in public transport vehicles.

The significance of poor safety and security is twofold. First, there is the direct injury and trauma suffered by victims. Second, there is the effect of the perception of vulnerability on the travel patterns of a much wider spectrum of people. The major constraint on the use of non-motorised transport (NMT) is the fear of accident or attack or of a bicycle's being stolen while it is parked. The sense of insecurity is usually experienced by potential passengers. While this affects all social groups, the most vulnerable people appear to be those who have no alternative to an insecure mode of travel, and whose protection takes the form of withdrawal from a socially important activity. When a wage earner in a poor family is badly injured, the whole family economy may collapse, because there is usually neither insurance compensation nor a social security safety net to protect them.

ACCIDENTS, SAFETY AND SECURITY IN URBAN ROAD TRANSPORT

A majority of accident victims are poor pedestrians' motorcyclists and bicyclists. Fears for personal safety and security significantly deter the use of non motorised transport. This burden of physical harm that is borne by the poor can be reduced by improved road design, traffic management, medical service, and by policy improvement. This solution requires comprehensive action by a well-trained, committed, adequately financed, and organisationally integrated public sector. Most of these efforts should be directed to design of infrastructure improvements or traffic management systems, with safety audits becoming a common part of new transport infrastructure projects.

The magnitude and nature of road accidents must be properly understood. Governments must be convinced that effective action is possible and that institutional arrangements can be put in place so that necessary actions can be effectively implemented. For that reason, the Global Road Safety Partnership, established as the result of a World Bank initiative, has concentrated its early efforts on mobilising the private sector and civil society to assume their responsibilities in road safety, increasing awareness of the nature of the problem, and identifying a limited number of pilot initiatives which can show that something can really be done about it. This section concentrates on the main elements of understanding the phenomenon, policy formulation, infrastructure design, traffic management, medical policies, and institutions.

A primary source of policy neglect has been the absence of reliable evidence on the magnitude and nature of the problem of transport safety. Road accident fatalities and serious injuries have long been known to be substantially underreported in official police statistics in developing countries. The situation is worse with respect to injury-only accidents.

The impact of road accidents is concentrated on some classes of vulnerable road users. Pedestrians account for more than twice the proportion of those injured in developing, as compared with industrialised countries, drivers and passengers of motorcycles and three-wheel motor vehicles. Public transport passengers, particularly those travelling in the back of a commercial truck or pickup truck, are very vulnerable. In many countries, drivers of trucks and buses have particularly bad accident records.

The location of accidents also varies significantly between countries. The majority of urban accidents in industrialised countries occur at intersections, while most urban accidents in developing countries are reported to occur between intersections. Relatively few accidents occur where there are any traffic controls, including traffic police. This is partly because in the absence of effective development control, unrestricted access to main roads increases the risk of a collision. It is also partly attributable to the different mix of vehicle types that are using the roads; this is particularly seen in the juxtaposition of motorised and NMT users, who are more vulnerable between intersections, where speed differences are greatest.

Identifying the most vulnerable locations, types of accident, and types of person involved is the basis for road-safety policy design. Introduction of an effective system of accident recording and analysis is thus a very high priority for international assistance. Because accident analysis would be useful to a range of agencies (including the police, the judiciary, insurance companies, car manufacturers, and traffic management agencies), the case can be made for the analysis to be done as independently as possible, perhaps by a road research institute.

A critical part of the development of an accident analysis capability is to persuade police superior officers and other traffic law enforcement agencies to collect, process, and transfer to the responsible agency the data needed for traffic safety analysis- rather than only those needed for legal purposes- and to train their staff accordingly.

INFRASTRUCTURE DESIGN AND PEDESTRIAN SAFETY

Pedestrian bridges play a critical role in connecting communities across the cities and urban centres. With a large number- of highways and major arterials close to residential neighbourhoods, pedestrians, cyclists and motorcycles rely upon these bridges to safely cross these roadways.

There is the need to address the varying levels of risk to pedestrians, bicyclists and motorcyclists exiting every pedestrian bridge in the city. While the bridges vary in general design, there are common design characteristics which are prevalent at each pedestrian bridge.

Based upon previous and current experiences, it is found that the greatest risk occurred at the landings of the bridges, or where the walkways returned to grade and exited onto the street. At these locations, there are two critical safety concerns to alleviate. The first concern was the orientation of the landing in relation to the connecting roadway. Depending on the configuration of these landings, both pedestrians and wheeled users (i.e. motorcyclists, and wheelchair users) approaching the landing and exiting the bridge are forced to enter the roadway under unsafe conditions, such as the lack of a protected crossing or stop controls for oncoming vehicles. This orientation of the pedestrian bridges and roadways led the ministry of works to identify a second critical concern, the need for bridge users to safely come to a stop prior to entering the roadbed.

There is no doubt that good design of road infrastructure can help substantially. Improvements in road surface and horizontal and vertical alignment at black spots has proved very effective in a number of cases. Clear definitions of, and implementation of a road hierarchy can help to match the use and operating speed of roads to their immediate environment.

Much is already well known about measures to protect the pedestrians and cyclists, who are the most vulnerable road users. Proper provision of footways, controlled signals for at-grade pedestrian crossings, grade-separated crossings, pedestrian-only areas, and segregated bicycle lanes and tracks are all effective and, in comparison with most infrastructure, relatively inexpensive.

Safety is a necessity rather than a luxury, but conventional methods of cost-benefit analysis may make it look like a luxury unless the benefits of improved safety are appropriately valued. There is, of course, an understandable reluctance to attribute a money value to the saving of life or to the reduction of pain and grief. Certainly international comparisons of the value of life are invidious.

For allocations of committed funds in explicitly safety-oriented projects, the issue can be evaded by use of cost-effectiveness analysis to compare alter native project designs. But where it is a matter of safety-related design components of investments, for which the bulk of impacts are time- or vehicle operating-cost savings, the omission of safety valuation, will make safe design appear as an uneconomic luxury. It is therefore suggested that all governments insist that safety benefits be attributed a value that appears reasonable in terms of local conditions. More-detailed advice on how they might approach evaluation is available.

Road-safety plans and action programs have been prepared in many countries, usually by external consultants piggybacked onto other projects. While these programs have been very broad, they were often led by road-safety professionals, with only limited support from the local enforcement and legal authorities.

TRAFFIC MANAGEMENT AND ACCIDENTS REDUCTION

Where there is no independent traffic-safety analysis unit, the safety functions of a "traffic management agency" generally commence with retrieval of accident data from the traffic police.

There is often no systematic, periodic transfer of data from traffic police to the traffic management agency, with data retrieved on an ad hoc basis to resolve particular accident problems. A methodical approach requires that the traffic management agency obtain data on a regular basis and that procedures be established within the traffic management agency to allow the accident data to be analysed to determine problematic sites, periods, groups, trends, and so on.

Various proprietary accident-analysis software programs are available, but any simple database software package can be used. Although, a traffic management agency may have a separate road-safety group with the responsibility to analyse accident data, promote safety programs, and review schemes, safety should be regarded as an integral part of any traffic management scheme design and should be an important evaluation criterion governing the acceptance of any scheme or measure. In some countries, such as the United Kingdom, all but the simplest of schemes are subject to an "Independent Safety Audit." This involves scrutiny by traffic management designers who were not involved in the original scheme planning and design. In some developing cities, it is acknowledged that there may be few experienced traffic management staff and there may be a lack of resources for hiring consultants. Nevertheless, the savings in social costs from the introduction of "safe" schemes should more than offset costs; the independent safety audit is worth consideration as part of the normal design process.

It is generally accepted that in industrialised countries, the three most common causes of fatalities and injuries are:

(a) excess driving speed;
(b) driving under the influence of alcohol; and
(c) inadequate protection of vulnerable persons in accidents.

At the national level, there should be enforced systematic policies for dealing with each, while at the local level those policies should be rigorously enforced.

Speed limits and controls are powerful instruments to reduce the severity of accidents. On local roads in the cities, a wide range of physical traffic-calming measures for speed control has been used effectively. Typical measures include:

- *Pedestrian refuges that narrow the effective road* width
- The control of vehicle overtaking (passing) and prevention of vehicles from reaching high speeds
- Road humps, to reduce vehicle speed
- Road narrowing, to prevent heavy vehicles from using a road or to restrict movement of vehicles to one direction at a time
- Chicanes, to force vehicles to follow a tortuous route and thus reduce speed
- Raised intersections, comprising a plateau or flat-topped road hump built across an entire intersection
- Plantings, to change the perceived width of a road in order to encourage vehicles to reduce speed.

On main roads, speed limits must be enforced by the traffic police by various means - direct measurement by radar guns, static or mobile camera enforcement, following vehicles, and so on. Traffic calming can also reduce traffic speeds, especially if carefully related to the hierarchy of roads. On main roads, effective devices include positive signs and road markings emphasising speed limits, rumble devices, bar markings, road texture and colour on the approaches to critical locations (intersections, pedestrian crossings, and so on), and adjustment of intersection traffic-signal timings to control and maintain a desired safe speed of traffic progression. However, some of the more extreme physical traffic-calming measures used on local roads might add to accident hazards if introduced on main roads.

The strict enforcement of stringent national standards on drinking and driving is the basis for reducing the second serious cause of accidents.

The right to perform random tests assists enforcement, but may be a platform for corruption in some countries. Holding employers of professional drivers, as well as the drivers themselves, responsible is also a powerful inducement to effective control, especially in public transport companies. Above all, it is important that it is the outcome (reduction of drunken driving) and not any particular procedure (for example, daily medical inspection of drivers as routinely required in many countries of the former Soviet Union) that is subject to control.

In industrialised countries, efforts to protect persons in accidents have concentrated on seat belt and airbag installation and use. In some middle income developing countries, the emphasis has been on the use of crash helmets by bicyclists and motorcyclists. In many poorer countries, however, the real issue is the protection of pedestrians from motorised vehicles; the provision of adequate sidewalks, barriers, and road-crossing facilities is most important. While the provision of pedestrian bridges or tunnels may offer the greatest potential protection, it may not be the most effective measure, especially where *the crossings involve arduous detours or are designed as a* potential operating ground for thieves.

MEDICAL POLICIES

There is considerable evidence that the lack of adequate medical facilities contributes to the high level of fatalities in developing country cities. Many lives could be saved if medical attention were provided within the hour immediately following an accident (the "golden hour"). This requires the improvement of emergency service response time, which can often be improved at modest cost by the following:

- Strategic positioning of emergency service centres (perhaps first aid stations at fuel stations)
- Provision of an emergency telephone number
- Establishment of a control centre
- Use of ITS (Intelligent Transport Systems) applications for efficient service control
- Setting up an emergency medical services committee
- Provision of first aid training
- Creation of a mechanism, possibly funded by insurance companies, to cover costs of minor expenses in bringing injured persons to the hospital
- Upgrading hospital emergency rooms and departments.

PERSONAL SECURITY AND THREATS

Personal security while engaged in transport activity is an increasing problem throughout the world. In a sense, this is not a transport problem but a symptom of a much wider social malaise. But the inescapable need to undertake travel to pursue essential activities of life-such as work, education, health care, and so on may force people into situations where they are most vulnerable to attack, with only a limited ability to adjust activities to avoid or ease their vulnerability.

Threats to security of person and property may be classified into four main types:

a) Theft by stealth, which is largely a function of crowding on public transport vehicles, but which may also involve the unattended parking of bicycles and other

vehicles. Theft by stealth is the most common manifestation of this problem, and is the most difficult to act against, but usually, fortunately, is the least traumatic of the phenomena. Passengers in vehicles can be frequently reminded of the need for caution, and of the best ways to secure themselves against theft. Automatic prosecution and exemplary sentencing of those caught can also be a deterrent. Provision for secure parking of bicycles has been an important element of policies that support bicycle ownership in some countries. Electronic surveillance may be effective in stations but less so (and more expensive) on crowded vehicles.

b) Theft by force, which can occur in crowded places but is more likely to occur in situations where the victim is relatively isolated. Theft by force includes vandalism and violent physical attack. Theft by force, because it is more likely to occur in less-crowded locations, is more susceptible to electronic surveillance, which, however, is only likely to be effective if accompanied by adequate arrest-and-arraignment arrangements. The existence of a specialist transport policing force has helped in rail and metro systems in industrialised countries, but is less likely to be affordable for the fragmented bus sector.

Vandalism, which is for in of property theft, and unruly behaviour toward passengers are common in poorly managed public transport operations in both developed and developing countries. Management changes or institutional reform can rapidly reduce vandalism. The first action of the new concessionaires was to introduce controllers (supported by government security guards) on each train-in part to control fare evasion and in part to establish a safer environment. There was a large degree of improved safety associated with train travel.

Perhaps even more than the public transport passenger, the pedestrian is increasingly likely to suffer violent attack. This may occur after dark as part of a robbery or, in the case of women, sexual assault. It can occur in business or residential districts, but is most common in low-income settlements controlled by gangs in the absence of a viable police presence. Again, the poor suffer most, because they are vulnerable to physical attack when walking from bus stops to home.

Travel by taxi is expensive-and often not even an option when drivers refuse to drive into dangerous neighbourhoods. In some countries, such as Nigeria, Ghana and South Africa, theft by violence from cars or of cars when stationary or slow moving has been a problem, against which drivers tend to protect themselves by the equally dangerous procedure of ignoring traffic signals, particularly after dark. Civilian neighbourhood patrols, common in some industrialised countries, may also play a role in improving safety from violent physical attack in the developing world.

c) Sexual harassment, which with different degrees of violence can occur in either crowded or isolated situations.

d) Political and social violence, which may have some transport significance (such as the attacks on commuters travelling by rail, bus, or minibus) or for which the transport vehicle may simply be an opportune location. Political and social violence often finds a focus in burning buses or destroying traffic signals, even where there is no transport-related stimulus. There are also some transport-specific origins of violence. Bus and rail passengers in cities are allegedly targeted in order to coerce them to ride the black-operated minibuses. Minibus passengers were also frequently caught up in murderous struggles between competing operators.

These types of insecurity are particularly susceptible to actions designed to regularise and give legally defensible property rights to operators of franchised services. Economically motivated policy reform in urban transport operations may thus have a very significant security payoff. The benefit accrued depends on the regulations being enforceable, and on being actually enforced, by legitimate authorities, and not by mafias.

Some general points may be made in conclusion. Increasing criminality in many developing cities is a symptom of a much wider social malaise. While it affects the transport behaviour of everybody, it is primarily the poor who suffer when essential trips for work or education are curtailed. Lack of security also frustrates environmentally motivated attempts to reduce the need for car travel when children can no longer safely walk or take the bus to school, and many people are obliged to go by car or taxi when even a short walk may have become too dangerous. To some degree, security in public transport might be improved by establishing minimum regulations on service quality.

There are some technical fixes to improve personal security for pedestrians, such as better street lighting and use of video or CCTV (Closed Circuit Television) monitoring of public spaces, but ultimately this is a function of much broader and more complex issues, such as social cohesiveness and the trade-off between police power and human rights concerns.

In each case, while the origin of the problem may not lie primarily in transport conditions, questions arise about the planning and management of transport facilities and services.

A STRATEGY FOR URBAN TRANSPORT SAFETY AND SECURITY

The development of a strategy for urban transport safety should include:

- Development of national road-accident statistics data collection and analysis capability
- Incorporation of safety elements in all transport infrastructure projects by the incorporation of a mandatory safety audit in the design process
- Incorporation of estimation and evaluation safety benefits of improved designs in all infrastructure projects, using values determined by government in collaboration with local safety agencies
- Development and associated training of staff for specific road-safety coordinating agencies or councils, both at the national and the municipal levels
- Specification, clear signing, and enforcement of maximum speed limits for different road categories in urban areas
- National-level specifications, advertising, and enforcement of limits for blood-alcohol levels for vehicle drivers
- Financing of specific safety-related infrastructure investment or the railway crossing investments based on the identification of vulnerable groups and locations
- Involvement of police in road safety, such as the collaboration between police and traffic management departments in black-spot analysis
- Involvement of medical authorities in joint planning for improved accessibility to medical facilities for victims of accident trauma
- Inclusion of compensation provisions and liabilities in motor traffic and associated insurance legislation
- Creation of high-level committees with responsibility for road safety in all major city administrations
- Development of plans for financing safety activities as part of transport strategy plans in all major municipalities.

With respect to security, serious effort remains necessary both to analyse the nature and significance of insecurity in the urban transport sector, and to devise policy instruments to counter it. These might include:

- Collection and analysis of data on personal security in the transport sector
- Development of an awareness of the problem, together with the commitment of police authorities to arrest, and the courts to appropriately penalize, delinquents
- Development of franchise conditions giving incentives for improved attention to security by public transport operators
- Including street lighting-designed to improve pedestrian security-in street improvement, and particularly in slum-upgrading projects
- Strengthening public participation in projects-particularly those dealing with improvements at the neighbourhood level.

RULES FOR PEDESTRIANS IN URBAN CENTRES: GENERAL GUIDANCE

Footways or footpaths (including any path along the side of a road) should be used if provided. Where possible, avoid being next to the kerb with your back to the traffic. If you have to step into the road, look both ways first. Always show due care and consideration for others.

If there is no footway or footpath, walk on the right-hand side of the road so you can see oncoming traffic.

You should take extra care and:

- Be prepared to walk in single file, especially on narrow roads or in poor light
- Keep close to the side of the road.

It may be safer to cross the road well before a sharp right-hand, bend so that oncoming traffic has a better chance of seeing you. Cross back after the bend.

Help other road users to see you Wear or carry something light-coloured, bright or fluorescent in poor daylight conditions. When it is dark, use reflective materials (e.g. ainibands, sashes, waistcoats, jackets, footwear), which can be seen by drivers using headlights up to three times as far away as non-reflective materials.

TRAFFIC AND PEDESTRIANS AWARENESS AND EDUCATION PROGRAMME

Walkways Environments

1. **Paved shoulders:** Paved shoulders provide room for pedestrians to walk separate from motor vehicle traffic in traffic areas when providing sidewalks is not a feasible option. Paved shoulders also provide room for bicyclists. Paved shoulders have many safety and operational advantages for motor vehicle traffic as well. To be effective, paved shoulders should be 1.8m (6 ft) wide or more: 1.2m (4 ft) is considered the minimum acceptable width to accommodate pedestrians. Traffic environments near large urban areas or those experiencing rapid growth should be considered suburban, where sidewalks are the preferred pedestrian accommodation. Newly-developed communities should provide sidewalks and other pedestrian facilities.

Urban and City Environments

1. **Sidewalks:** Sidewalks can eliminate most walking-along-the-road pedestrian crashes by providing positive separation from motor vehicle traffic. Continuous and connected sidewalks are needed along both sides of streets to prevent unnecessary street crossings. Sidewalks generally should not be placed immediately adjacent to moving motor vehicle traffic. Whenever possible, they should be buffered with a planter strip, parking lane, shoulder, or bike lane. This will increase pedestrian safety and comfort and can make it easier to meet the ADA requirement for a level passage through driveways and the requirement for a

clear passage around utility poles, posts, fire hydrants, etc. (these can be placed in a landscaped buffer zone). Planter strips should be 1.5m (5 ft) wide or greater; 1.8 m (6 ft) is a desirable minimum. Separated sidewalks should also be 1.5 m (5 ft) wide or greater; 1.8 m (6 ft) is a desirable minimum along arterial streets in non-commercial areas.

Along arterials where there is no buffer, curb side sidewalks should be 3.0 m (10 ft) wide or greater. Sidewalks should provide a continuous effective width to prevent choke points from being created by street furniture. In downtown areas, considerations must be made for outdoor seating for restaurants. Rolled (mountable) curbs are not recommended. Continuous and connected sidewalks are needed along both sides of streets to prevent unnecessary street crossings.

2. **Driveways-Well-defined:** Driveways clearly mark the area where motorists will be crossing the pedestrian's path. Non-defined vehicle access points with continuous access to parking create a long conflict area between pedestrians and motorists. This added area of ambiguity complicates the motorist's task of watching for pedestrians.

3. **Driveway design and spacing:** Driveways should be designed to look like driveways, not street intersections (sidewalks should continue through the driveway). Local policies should prohibit blocking the sidewalk at driveways and these policies should be enforced. Driveways should be kept as narrow as possible. The level of the sidewalk should be maintained, and the driveway should be sloped so that the motorist goes up and over the sidewalk. This will help with a number of goals: meeting ADA accessibility requirements will be easier, the fact that the pedestrian has the right-of-way will be clear, and motorists will need to slow down slightly to enter the driveway, which will help promote pedestrian safety. Driveways should be located away from intersections. The number of driveways should be minimised (consolidate whenever possible) to reduce the number of conflict points for pedestrians. This access management is also a safety advantage for motorists.
4. **Illumination-Pedestrian:** crashes disproportionately occur at times of poor lighting (mostly dusk and night-time). Illumination greatly increases the motorist's ability to see pedestrians walking along the road. Double-sided lighting should be provided along wide arterial streets to illuminate both sidewalks for the security and safety of the pedestrian. Light uniformity along a road is also important. Lights should be spaced to minimise or eliminate dark areas along the road and sidewalks. For midblock and intersection crossings, it may be helpful to provide extra lighting to crossings with high night-time pedestrian use.

Crossing the Road Crashes Midblock crashes:

1. **Pedestrian crossing island** - On two-way streets, a median island at uncontrolled locations can help reduce crashes by up to 40 percent. The benefits are greatest on busy multilane streets where gaps are few and difficult to find. A pedestrian crossing island breaks an otherwise difficult crossing manoeuvre into two easier steps: instead of needing to find a gap long enough to cross all lanes at once a pedestrian looks left, finds an acceptable gap in one direction only, crosses to the island, then looks right and finds a second gap.

2. **Two-stage crosswalk with median fencing** - Some agencies provide railings/fencing in the medians of multilane roads that channel pedestrians to the right, increasing the likelihood that they will look for vehicles coming from their right in the second half of the crossing. It should be mentioned, however, that these types of crossings can be problematic for pedestrians who are blind and for wheelchair users.

3. **Curb extensions** - On streets with on-street parking, curb extensions reduce the total crossing distance. Reducing the crossing distance helps pedestrians in two ways: it reduces the time they are exposed to moving traffic, and it makes it easier for pedestrians to assess and find an acceptable gap, as the time needed to cross is shorter. They also increase visibility: the waiting pedestrian can better see approaching motor vehicle traffic and motorists can better see pedestrians waiting to cross the road; their view is no longer blocked by parked cars. Curb extensions should be designed to accommodate storm water drainage and should never extend more than 1.8 m (6 ft).

4. **Crosswalks at uncontrolled locations with advance stop bar (or yield line)** - On multilane streets a common and often fatal crash type is the "multiple-threat" crash, in which a motorist in one lane stops to let a pedestrian cross, but so close to the crosswalk as to mask a motorist in the adjacent lane who is not slowing down. The second motorist does not have time to react and the pedestrian is struck at a high speed. The advance stop bar or yield line (accompanied with a R1-5 or R1-51a YEILD HERE TO PEDESTRIANS sign) requires all motorists to stop back (30 to 50 ft is desirable); when the first motorists stops at the stop bar, it allows the pedestrian to see if a motorist in the second lane is stopping. This enables the pedestrian to wait or step back if he or she has started to proceed into the second lane. While the advance stop bar with appropriate signing has the potential to reduce the probability of a multiple-threat crash, this is no guarantee that 1)all motorists will stop for pedestrians and 2) all stopping vehicles will necessarily stop at the stop line, potentially on high-speed roads.

Therefore, it is important to carefully select locations for unsignalised crossings, even if the advance stop bar and signing is used. Also, such sites should be monitored to ensure that pedestrians are able to cross safely and if not, then other treatments (e.g., traffic signals) should be considered.

5. **Traffic signal with pedestrian signal displays** - On busy multilane highways with significant volumes, a signal may be the only way to create a gap for pedestrians to cross. It is often difficult to meet the MUTCD warrants for a traffic signal based solely on existing pedestrian counts; it is often necessary to anticipate how many pedestrians might cross there once the signal is installed. All signals have associated operational and safety concerns that must be addressed, including the distance to adjacent signals.

Night-time Pedestrian Crashes:
Many night-time crashes can be prevented through better lighting.

Intersection Straight-Through Crashes:
Most of the techniques described under midblock crashes are applicable at intersections for straight-through crashes: pedestrian crossing islands, curb extensions, illumination, and advance stop bars or yield lines.

1. **Tighter radius** - Tightening the intersection radius has many benefits for pedestrians: it shortens the crossing distance, brings the crosswalk closer to the intersection, increases visibility of the pedestrian or the approaching motor vehicle, slows right-turning vehicles, and it makes it much easier to install two ADA compliant curb ramps at each corner. The choice of a curb radius is dependent on the design vehicle and whether the street is a local residential street, a neighbourhood collector, or a major arterial. This requires the designer to calculate the appropriate radius for each corner of an intersection and to accept occasional difficult turns for the rare event-for example a large moving truck turning onto a local street; this occurs seldom enough that there's little reason to provide large radii for truck turns onto local streets. The presence of on-street parking on both intersecting streets can also result in the opportunity to tighten the curb radius.
2. **Pork-chop island** - while right-turn slip lanes (also called channelized right-turn lanes) are often considered negative facilities for pedestrians (especially vision-impaired pedestrians) due to the emphasis on easy and fast motor vehicle travel, they can be designed to be less problematic. Where an exclusive right-turn lane is provided, a pork-chop island between the right-turn lane and the through lanes can shorten the crossing, resulting in less pedestrian exposure and improved signal timing. The island also enables pedestrians and motorists to negotiate one conflict separately from the others. A properly designed pork-chop island has the longer tail pointing upstream to the approaching right-turn motorist; this channelization brings the approaching motorist at close to a 90° angle, so the motorist is looking forward at the crosswalk; the crosswalk is placed one car length back from the intersection proper. This enables the motorist to move forward once the pedestrian conflict has been resolved so the right-turning motorist can focus on traffic. The pedestrian then can cross to a shorter street crossing.

EDUCATION AND TRAFFIC AWARENESS PROGRAMS
Education plays an important role in the process to improve pedestrian safety. Education efforts can improve the ability of drivers and pedestrians to use and respond to the roadway environment safely and correctly. Education can complement enforcement programs to teach motorists and pedestrians about safe driving and crossing practices, as well as the laws that govern them.

Numerous research studies have supported the notion that education efforts can succeed in changing pedestrian and driver behaviours and reducing pedestrian crash risks and rates. Some of the successful earlier programs aimed at the conditions of those times include:
Education is an important and effective part of a pedestrian safety program, but having streets designed for pedestrians is a prerequisite. Most education campaigns will have limited long-term success if the streets are designed for high-speed traffic and do not safely accommodate all users.

While many education programs have shown positive results in improving pedestrian safety, others have failed to demonstrate significant improvements. This is likely because not all education efforts have all the necessary components for success or are not tailored to meet the needs of the community. To ensure the most effective and successful education programs, an agency should:

- Understand the local context and apply messages to the appropriate audience.
- Combine and coordinate the education program with other planning, engineering, and enforcement measures.
- Use both concentrated short and long-term efforts.
- When appropriate, supplement informational programs (i.e., programs using PSAs or other passive education techniques) with opportunities to put learning into practice (i.e., skills training or active education).

Defining Education-Related Problems and Goals
Education programs and campaigns work best when there is a clear understanding of the audience, the objective, and the messages to be conveyed. Such programs produce the greatest safety benefits when they are part of a long-term program and not just designed to achieve short-term changes. The education program should target a real and specific community problem. In some cases, behaviour-related problems are a symptom of other concerns, such as poor street design or lack of enforcement; in these cases, education should be coupled with additional measures to

treat all of the underlying factors related to the concern. Examples of common pedestrian-related problems that can be addressed (in-part) through education include:

- Pedestrians at an intersection don't appear to understand the newly installed pedestrian signals and/or don't choose to activate them. The novelty of the signal requires some additional information on its meaning and use.
- Pedestrians do not think they have enough time to cross at a traffic signal.
- Drivers don't yield to pedestrians in crosswalks.
- Parents don't understand the need to supervise children under the age of 10 when they are walking.
- Children ages 10 to 18 don't know where or how to safely cross a street to get to school.
- Motorists are speeding in neighbourhoods.
- Commuters in the downtown area aren't taking advantage of non-motorised modes of travel.
- Pedestrian crashes are occurring in an area with a concentration of bars due to pedestrian drinking and walking.
- Designers and engineers aren't using pedestrian-friendly design practices.

Though, there are many studies showing that education can have an impact, it is equally relevant to consider local conditions and factors to develop an education program tailored to the community. The goals of an education program should be specific, measurable, and related to the problems identified. For instance, if an intersection safety study reveals that only 20 percent of pedestrians are activating the push-button (assuming the button is properly designed and located and works correctly) for a crossing signal, an education campaign can be developed to focus on increasing pedestrians' understanding of the existence and benefits of the crossing features. The goal should be to increase activation of the push-button and safe crossing behaviour. Establishing baseline conditions helps in setting realistic goals and evaluating program effectiveness.

Targeting Specific Audiences

There are major differences in the knowledge of safe pedestrian practices, walking abilities, behavioural patterns, and learning capacities of different groups of pedestrians and other road users. Because of this, education programs need to be tailored to the specific audiences and types of safety problems they intend to address, and to the behaviours they seek to modify. Common audiences for focused, pedestrian-related education programs include:

1. Road users, including:
   a) Child pedestrians (several different age groups)
   b) High school and college age pedestrians c) Adults
   d) Drivers
   e) Alcohol consumers (especially heavy drinkers)
2. Commuters/ employees
3. Transportation officials and decision makers, including engineers, planners, developers, local officials/ leaders, and law enforcement officers.

These audiences can be reached in a variety of ways: through public awareness campaigns reaching a broad group of people at once; through interventions targeting narrow groups or situations; or through an intermediary-such as a paediatrician, a parent, or a grandparent-targeting people on a one-on-one basis.

For an education program to be successful, it is important to consider:

1. When and how the audience should receive information- for instance, children, depending on their developmental level, may not be able to understand certain messages or complicated images used to convey messages.
2. Demographic factors-for example, the percentage of non-English speakers in a community affects the development of the educational materials. Educational materials in several languages and/or a range of distribution methods (e.g. PSA, posters, or presentations to neighbourhood groups) may be needed for certain populations.

The following sections provide important safety messages and strategies for conveying those messages to each of the aforementioned groups. Based on identified safety concerns, goals, and other considerations (e.g., available resources, etc.), each community should determine that most important group or groups to target in an education program and the appropriate strategy to use.

Key Educational Messages and Strategies for Targeted Audiences

Educational messages for road users commonly focus on improving personal safety and obedience to traffic laws. Campaigns aimed at commuters or employees often focus on messages to encourage drivers to use carpools or transit, or to consider non-motorised transportation modes. Education and training programs aimed at transportation officials and decision makers usually focus on encouraging stronger support for policies, programs, and facilities that promote safe walking.

The following sections provide more detailed educational messages that could be incorporated into education campaigns and strategies that could be used to target the audiences described earlier.

Educating child *(elementary and middle school) pedestrians*

Being struck by a car is a leading cause of death and injury to children. Children, especially males' age 5 to 9, are at high risk of being hit in a pedestrian crash. Young children are frequently struck on the neighbourhood streets near their homes. The task of teaching pedestrian safety to children is complicated by their level of development. To obtain significant results, education programs must

improve knowledge and awareness and teach skills appropriate for the level of development of the children they target. One excellent resource for educating children about pedestrian and bicycle safety skills is the Education section of the National Centre for Safe Routes to School. It describes what groups to bring together to educate children (including parents, caregivers, and teachers) and others who need to know about children's needs and abilities as bicyclists and pedestrians (including drivers and neighbours). It also addresses when education programs need to take place.

There is less information available on messages and strategies targeting middle-school age children. What is known is that middle school children still need skills practice as well as exposure to messages that convey the importance of walking and safety. To be effective, these messages should be conveyed within themes that matter to that age group, such as fitness and independence. Pre-teen audiences can be difficult to reach, so creativity is a must in any educational effort. Some potential strategies for targeting middle school age children include:

- Put them in control-Organise a student committee to address the problem of safety, physical inactivity, or issues related to excess weight.
- Ask them to come up with contests or program ideas.
- Integrate walking into the culture in a subtle way-Have teachers and administrators walk on local field trips.
- Start a Kids Teaching Kids program-Middle school students can develop a safety assembly for elementary students and then deliver it (or high school students can deliver it to middle schools). Make sure that the student teachers are well-trained to convey correct strategies and that the teaching is within the children's developmental level.
- Use multimedia to convey messages-Consider the use of music, video games, and computer software in addition to traditional media. Ask students to consider how many songs have the word "walk" in the title. Think about using "walk" songs as "music of the week" or as links in a class assembly about walking to school has bicycle safety messages incorporated into an online comic book and safety tests; the site also offers a bicycle stunt show. How GIS and Pocket PC technology has been used to engage youth in pedestrian safety issues.

Educating high school and college-age pedestrians

High school and college-age students represent unique pedestrian education opportunities and challenges. High school students are probably the least likely of any student age group to walk to school, either because their high schools are sited in areas where they are unable to walk safely to school, or because they want to take advantage of newfound driving privileges.

However, ignoring high school populations for education programs would be missing an important opportunity to engage young drivers (and pedestrians) in safety issues. One excellent way to reach high school students is to couple pedestrian and safety issues with broader concerns about transportation, health, and the environment. Almost every high school has an environmental club or other group that will help champion these messages; at the high school level, messages that come from peer groups may be better received than messages coming from teachers, parents, or other authorities.

Many college-age students are more likely to walk and bike than drive on campus. This is due to restricted campus parking, the expense of car ownership, and the fact that students are young, able, and generally more physically fit than other age groups. They are an ideal target for pedestrian safety and promotion campaigns. However, college-age students also tend to take more risks than many other age groups, such as older pedestrians. They have a stronger perception of "invincibility," and may be apathetic to safety outreach initiatives. Also, alcohol can be a factor, even for campuses that are technically "dry."

Several universities have developed education programs and campaigns in partnership with their Parking and Transportation Services Office or Department of Public Safety. The College of New Jersey and the University of Kentucky distribute a student-oriented pamphlet of "tips, guidelines, and resources" for getting around the campus "quickly, conveniently, and safely." Key messages include:

- Reasons to walk or bike:
  - Save money.
  - Stay healthy (avoid the "Freshman 15").
  - Avoid vehicle parking hassles.
- Tips for crossing campus safely on foot:
  - Cross the street at marked crosswalks or at intersections, and observe traffic-control signals. At intersections, watch for turning vehicles that may not be yielding to pedestrians.
  - Yield to motor vehicles and bicyclists when you are not in a crosswalk or are not crossing at an intersection.
  - Stay to the right on shared pathways and avoid walking in "bike only" lanes.
  - While walking or jogging alongside a road without sidewalks, always walk or jog facing traffic.
  - Make eye contact with oncoming motorists and cyclists, indicate your intention to cross (e.g., extend your arm, place a foot in the crosswalk, or lean toward the crossing), and wait for the driver to slow or stop.
  - Avoid cell phone use when walking in congested areas or crossing busy streets; wear bright colours and walk in well-lighted areas at night; don't step into the street from behind an obstruction.

Some important strategies for educating high school and college-age pedestrians include:

- Develop partnerships for education programs-with Parking and Transportation Services Office,

Department of Public Safety, campus health organisations, public health/ injury prevention alliances or student associations, or other student groups such as walking/bicycling clubs or environmental groups.

- Take advantage of campus life and university events-distribute pamphlets or other materials at new student orientation, large student assemblies (such as sporting events), or through campus housing.
- Give incentives-While distributing safety messages, garner student interest by giving away food, wristbands, retro-reflective gear, posters, coupons for local restaurants, or other freebies.
- Tailor a program to relate to specific student population needs and interests-This helps engage students in understanding why pedestrian safety is important and how it affects them directly. They learn what they can do, both personally and as part of the school or college/university, to improve pedestrian safety and increase walking on campus and beyond.

Educating adult pedestrians

The challenge of walking along and crossing streets can make a casualty of even a fit, healthy and alert adult. Bad weather, fast-moving traffic, in attention by drivers or pedestrians can make situations worse. Some general pedestrian safety messages include:

- Make yourself visible to drivers
- Wear retro-reflective materials and bright/light colour clothing.
- Carry a flashlight when walking at night.

Use caution when wearing headphones and talking on cell phones while walking, especially when crossing the street.

- Stand clear of buses, hedges, parked cars or other obstacles before stepping into the street so drivers can see you.
- Avoid dangerous behaviours
- Always walk on the sidewalk; if there is no sidewalk, walk facing traffic.
- Stay sober; walking while impaired increases your chance of being struck.
- Don't assume vehicles will stop; make eye contact with drivers and wait until they show signs of slowing or stopping for you.
- Cross with traffic signals and not against the DON'T WALK signal.
- Don't rely solely on pedestrian signals; look before you cross the road.
- Watch for cars backing up in parking lots and near on-street parking spaces.
- Look before you take a step.
- Cross streets at marked crosswalks or at intersections, if possible.
- Look left, right, behind, and left again before crossing a street or stepping into traffic.
- Watch for turning vehicles; make sure the driver sees you and will stop.
- When crossing multiple lanes, look across all lanes you must cross and visually clear each lane before proceeding.

Strategies for educating adult pedestrians include:

Incorporate pedestrian safety messages into public relations efforts (news release, fact sheets for local officials, press events, etc.). Highlight pedestrian facilities when introducing new infrastructure. Create a web-based pedestrian safety quiz on a local agency Web site for the purpose of educating pedestrians.

Educating older pedestrians (65+)

For older pedestrians, whether they are in good health or not, working can provide strong health and quality of life benefits. However, research has shown that older pedestrians are often overrepresented in fatal pedestrian crashes. If they survive the crash, they may be disabled or confined to a nursing home. Older adults are often struck while crossing streets in crosswalks or by drivers making turning movements through crosswalks.

Older adults can be receptive to well-crafted safety messages. In addition to the general messages described in the "Adult Pedestrian" section, key messages for older pedestrians could include:

- The threats presented by cars making turns.
- Tips for crossing intersections slowly but safely, including waiting for a `fresh green light before crossing at a signal.
- Good choices of footwear (for better traction) and visible clothing (bright and retro-reflective) for walking at night.
- Tips for avoiding backing vehicles, including watching for back-up lights on vehicles or listening for engine noise before walking behind vehicles.

Strategies for educating older pedestrians include:

- Initiate campaigns to targeted settings/situations where older pedestrians may be concentrated (e.g., retirement communities, healthcare clinics/hospitals, libraries, churches, etc.).
- Contact established organisations, such as AARP, or community centres that may already have a strong network with the older pedestrian community.

Educating drivers

An important educational feature is how motorists come to think of pedestrians. Most motorists do not adequately look for pedestrians and this is, in part, a result of how public or law enforcement officials educate them and enforce (or fail to enforce) certain behaviours. In pedestrian-vehicle crashes, the pedestrians are often blamed, even when the motorist was at fault because of the underlying assumption is that streets are primarily for motorists. Educators and law enforcement officers need to work to change these views to ensure that pedestrians are accepted as legitimate users of the street network.

Roadway safety is a shared responsibility, and motorists have their fair share of things to do to comply with the rules of the road and help keep pedestrians safe. Some general driver safety messages include:

- Watch for pedestrians at all times
- Scan the road and the sides of the road ahead for potential pedestrians.
- Before making a turn, look in all directions for pedestrians crossing.
- Don't drive distracted or after consuming alcohol or other drugs.
- Do not talk on a cell phone while driving.
- For maximum visibility, keep your windshield clean and headlights on.
- Yield to pedestrians at crossings
- Yield to pedestrians at crosswalks, whether marked or unmarked.
- Yield to pedestrians when making right or left turns at intersections.
- Do not block or park in crosswalks. Provide a safety zone for pedestrians.
- Drive within the posted speed limit and avoid aggressive manoeuvres.
- If you are travelling on a road with more than one lane of traffic, be especially aware of motor vehicles stopped for a crossing pedestrian.
- Do not pass the stopped vehicle.
- Obey speed limits and come to a complete stop at STOP signs and signals.
- Always be prepared to stop for pedestrians.

Strategies for educating drivers include:

- Plug into local media-have driver safety awareness campaigns on TV, radio traffic-watch PSAs, and in newspapers; host a commute-time radio talk series on pedestrian safety issues, or develop an ad campaign to be displayed on billboards, in parking garages, or in other places most visible to drivers.
- Most walkers are drivers, too. Place and distribute driver safety material alongside pedestrian safety material.
- Couple education with enforcement to reinforce drivers' knowledge of and compliance with pedestrian-related laws. Add pedestrian safety information to state drivers' license manuals and on maps where traffic safety tips are displayed that are provided by a state or community.
- Create web-based traffic safety quizzes (that includes pedestrian safety questions) on a local agency Wed site for the purpose of educating drivers. Use engineering treatments (such as roadway signs and in-street signs) to alert drivers to pedestrians and spread educational messages about yielding to pedestrians. See the Engineering treatments section for more engineering tools related to educating drivers.

Educating alcohol consumers

Most people know the risks of drinking and driving, but what many people may not know is that excessive drinking can have the same deadly consequences for pedestrians. Alcohol plays an important factor in one-third of all pedestrian deaths-this number is based on pedestrians who have been drinking and doesn't include drinking on the part of the driver. Alcohol-related pedestrian deaths often involve males and occur at night, especially on weekends. Unfortunately there are typically no `drunk pedestrian" laws that allow police officers to arrest and easily remove a pedestrian from harm's way. The problem of alcohol impaired drivers and pedestrians are complex, and require a multifaceted approach including both education-based programs as well as other intervention methods, including engineering and enforcement.

Alcohol impairs physical agility and balance. It also adversely affects vision, judgment, and other thought processes, which become extremely important when pedestrians try to cross the road. It is widely accepted that the alcohol impaired driver is a major threat to pedestrians and all other road users. Researchers have also found that for a pedestrian, high levels of blood alcohol are associated with an increased risk of being hit by a motor vehicle. The following messages for alcohol consumers are described in the NHTSA resource guide, **The Facts: Impaired Pedestrians:**

For motorists:

- Do not drive impaired. It slows your reaction time, impairs your judgment, and affects your alertness and coordination.
- When you drive, particularly at night around populated areas, watch for sudden, unexpected movements by pedestrians. Scan the road widely and often, and prepare for the unexpected. Slow down!
- If you know someone who has been drinking and is planning to walk, call them a cab or offer to drive or escort them, even if it is only a short distance.

For pedestrians:

- Remember that alcohol affects your balance, impairs your judgment, and reduces your alertness and coordination. It can also affect your vision.
- Limit how much alcohol you consume, especially if you plan to walk. Do not fool yourself about your ability to walk in traffic safely.
- Be more visible to traffic by carrying a flashlight or wearing retro-reflective clothing at night. During the day, wearing fluorescent colours is best. Wearing white, especially at night, is not enough for you to be seen adequately by motorists.
- If you know someone who has been drinking and is planning to walk, offer to call them a cab or escort them, even if it is only a short distance.

One strategy for educating alcohol consumers is to initiate public awareness and education campaigns to inform pedestrians and alert drivers about the hazards associated with walking while impaired. It is also important to train law enforcement officers and point-of-sale personnel

about impaired pedestrian issues and the dangers of over-serving in general.

The following are some additional strategies that could be combined with public awareness campaigns to provide a more comprehensive approach to the alcohol issue:

- Develop or amend local or state laws that control the availability of alcohol (e.g., laws that dictate when bars must close, etc.).
- Develop or amend laws to allow police to arrest or detain a pedestrian if they are out walking impaired and may harm themselves or others.
- Work with health officials, employment centres, and other related groups for the early identification and treatment of persons with alcohol problems.
- Address environmental issues (e.g., through improved lighting, speed control measures on commercial strips, etc.) and devise different interventions for use on high-speed roads in rural areas, and medium speed roads in urban areas where there is a pattern of drunk pedestrians being struck by motorists. See the Engineering solutions related to environmental issues.

Educating commuters/employees

There are many who drive to work daily who could walk, bicycle, or take transit. Often, this creates unnecessary roadway congestion, which may lead to increases in motorist-pedestrian crashes, as well as increases in pollution. Many communities and local agencies have transportation demand management (TDM) programs, which aim to educate road users about their commute choices, provide incentives and alternatives to reduce driving to work, and can result in more efficient use of transportation resources. Educating commuters about travel options, benefits, and safe practices is an important component of any comprehensive pedestrian education program. The key to encouraging more commuters to travel by foot is to educate them on the benefits of walking and the feasibility of doing it.

Educating employees about the benefits of walking and safe walking/driving habits can be part of a company or agency traffic safety program. It is not uncommon for large companies to institute a driver safety program to reduce the chance that their employees will get into a crash, keep insurance premiums Low, and help reduce the company's exposure to tort liability by reducing crashes. Some companies, such as Dow Chemical, require employees to take a traffic safety and map reading course before being allowed to travel for the company. Others require employees to take a mandatory defensive driving course every couple of years. Companies can include information on safe walking practices and driving practices around pedestrians in their curricula.

- Hold bicycling and walking events and activities, particularly on trails and cycling routes.
- Develop bicycling and walking commute campaigns; these can involve contests as to which workers and worksites commute most by non-motorised modes.
- Provide and promote bicycle parking, showering, and clothes changing facilities at worksites, transportation terminals, and other destinations.
- Develop and distribute education materials and programs that teach cycling skills.

THE LAGOS METROPOLITAN AREA TRANSPORT AUTHORITY, LAMATA

It was created by an act signed into law on January 13, 2002 and formally launched on the December 2, 2003. LAMATA is to ensure the highest level of service in public transportation in the Lagos metropolis by executing the LUTP.

LUTP and LAMATA however have their antecedents in various laudable efforts by different administrations and individuals as far back as 1978. These efforts resulted in the identification of the LUTP. Governor Bola Ahmed Tinubu's administration revisited and pursued the project with vigour on inception in 1999, culminating in the World Bank's approval in April 2001.

LAMATA is a semi-autonomous corporate body with an independent 13 member board, representing government and private transport sector operators. It is vested with the overall responsibility for promoting and developing public transportation in Lagos, managing the strategic road network in Lagos, promoting effective cost recovery in the transport sector and coordinating the delivery of transport projects in Lagos.

It has the primary mandate to play a leading role in carrying out transport planning for the metropolitan area and assist in transport policy formulation, coordination and implementation of major operational and investment decisions.

The Authority is designed to carry out the comprehensive maintenance of roads and related infrastructure, inventory of road and transportation network, continuous evaluation of road network status, overall improvement in traffic flow and planned and programmed traffic engineering and management works. Its other tasks include overall improvement of public transportation systems, and orderly and structured development of the rail and water mass transit systems, among others.

Detailed Responsibilities

In greater detail, LAMATA also has the responsibility to:

- Co-ordinate the transport policies, programmes and actions of all transport related agencies in the Lagos metropolitan area.
- Maintain and manage the declared road network of about 632 kilometres within Metropolitan Lagos. This may be expanded as the need arises.
- Plan, coordinate, manage and develop the supply of adequate and effective public transportation within Metropolitan Lagos.

- Recommend on route planning and general location of bus shelters, pedestrian ways and bridges.
- Collect and levy transport road user charges and establish a Transport Fund to sustain the performance of LAMATA.
- Coordinate activities of the State Licensing Authority and all vehicle inspection units.
- Recommend on policy issues on public transportation to the Governor including mechanisms for implementation.
- Prepare plans for the management and development of transportation in Metropolitan Lagos.

Neighbourhood Speed Watch

Neighbourhood Speed Watch programs are a traffic-related variation of neighbourhood watch or crime watch programs. Such programs encourage residents to take an active role in changing the behaviour of motorists on their neighbourhood streets by helping raise public awareness and educate drivers about the negative impact of speeding. Residents record the speed, and the license plate and vehicle information of speeding motor vehicles using radar units borrowed from a local law enforcement agency. This information along with a letter is sent to the owners of the vehicles informing them of the observed violation and encouraging them or other drivers of their vehicles to drive in compliance with the posted speed limit. This type of awareness encourages some speeding drivers to slow down, but it often has limited long-term effectiveness in changing the problem, and many people are reluctant to `tattle" on their fellow residents. Neighbourhood Speed Watch programs can educate neighbours about the issue and help boost support for long-term solutions, such as traffic calming. Drivers also learn that residents will not tolerate speeding in their neighbourhoods. This program is more effective when implemented along with a neighbourhood education program involving distributing traffic safety information through door hangers or other means.

The organisation of neighbourhood speed watch programs can vary. Some jurisdictions have "Citizen's Patrol" elements in the police department and others have neighbourhood volunteers to oversee the program.

Slow Down Yard Sign Campaigns and Pace Car Campaigns

Slow down yard sign campaigns allow residents to participate in reminding drivers to slow down. Neighbourhood leaders, safety advocates and law enforcement officials wok in partnership to identify problem areas, recruit residents to post yard signs, organise distribution of yard signs, garner media attention, and evaluate the effectiveness of the campaign. Slow down yard sign campaigns may be conducted along with other speed enforcement efforts, such as progressive ticketing campaigns, and other safety efforts, such as neighbourhood pace car campaigns and the use of speed radar trailers.

An evaluation of a yard sign campaign by the Safe Community Coalition of Madison and Dane County, Wisconsin, concluded that the signs are noticed and people do slow down when the signs are up, especially when speed boards are used to show drivers their approaching speed.

Neighbourhood pace car programs aim to make neighbourhoods safer for pedestrians, bicyclists and drivers. Resident pace car drivers agree to drive courteously, at or below the speed limit, and follow other traffic laws. Programs usually require interested residents to register as a pace car driver, sign a pledge to abide by the rules, and display a Pace Car bumper sticker on their vehicle.

Neighbourhood Fight Back Programs

Neighbourhood Fight Back programs are collaborative efforts between local governments and concerned residents to address crime, blight and other issues negatively impacting their neighbourhoods. Though, typically used to address illegal drug and other criminal activity, traffic and pedestrian safety is another area of concern targeted by Fight Back programs. The local government provides mufti-agency support over a limited period of time to concentrate enforcement activities in specific neighbourhoods.

Adult School Crossing Guards

Well-trained adult school crossing guards can play a key role in promoting safe driver and pedestrian behaviours at crosswalks near schools. They help children cross the street safely and remind drivers of the presence of pedestrians. A guard helps children develop the skills to cross streets safely at all times. Adult school crossing guards can be parent volunteers, school staff or paid personnel. Annual classroom and field training for adult school crossing guards as well as special uniforms or equipment to increase visibility are recommended, and in some locations required.

Safe Routes to School Programs

Safe Routes to School (SRTS) is a national program teaching education, enforcement, engineering, and encouragement strategies for communities to make walking to school safe and more widespread. The main goal for SRTS enforcement strategies is to deter unsafe behaviours of drivers, pedestrians, and bicyclists, and to encourage all road users to obey traffic laws and share the road safely. Enforcement used alone will not likely have a long-term effect.

Communities must utilise a combination of strategies to address the specific needs of their schools and achieve long-term results.

Although, SRTS programs vary among communities, they often include exercises to map out the best ways to walk to school and implement strategies to encourage more walking. These plans can relate to enforcement and help

identify where crossing guards or police enforcement can significantly reduce crash risk.

Safe walking routes can also be developed to help other groups, such as senior citizens, identify routes to walk to nearby stores and medical centres. Developing the route maps can help target problem areas for improvements.

Recommended Law Enforcement Approach

Effective law enforcement has four basic steps:

1. Notify the community. An effective program will seek to notify all community members that a strong traffic law enforcement program is beginning.
2. Use public awareness and education first. Public awareness and education is effective when applied prior to law enforcement activities. The awareness and education messages should inform people of the problem and why enforcement action is needed. This will generate public support and help offset complaints from those who are caught breaking the law. The public then needs to know what the enforcement activities will be and when they will start, as tickets are more likely to hold up in court when this groundwork has been done. Mass mailing and media campaigns using local television stations, radio and newspapers may help spread the message. Radio 'traffic watch' programs are an excellent way to spread the traffic safety message. Portable speed limit signs and speed reader boards are effective tools for providing real time speed information to drivers. For some drivers, raising that awareness may be enough to cause them to alter their behaviour.
3. Provide officer training. Officer training is critical to an effective law enforcement program. The training should occur prior to the start of an enforcement program and include information on why, what, when, where and how law enforcement should occur to maximise behaviour change, and to reduce the number of crashes involving pedestrians. Existing laws that impact pedestrian safety should be reviewed and discussed. For example, the officers need to know the definition of crosswalks includes unmarked crosswalks and they need to know pedestrian and motorist rights and responsibilities in crosswalks.

For the engineering component, the town worked to develop a multi-media transportation improvement plan; improve pedestrian access to transit and to the waterfront; and facilitate the development of pedestrian improvements to Cliff Street and other locations. On the enforcement side, the department worked with the Mayor and the Police Department to distribute educational materials to violators, with specific information targeted at motorists, cyclists, pedestrians. Extra enforcement in the downtown area focused on bicycle- and pedestrian-related violations. For the education component, public service announcements were broadcast over radio and television and displayed on safety slides at the downtown cinema. The Department of Public Works collaborated with the Mayor, Police Department, and local advocacy organisations to develop press releases and hold press conferences highlighting safety initiatives, using the media to spread the message. Additionally, safety coupons were designed and distributed for discounts on retro-reflective clothing and other safety products.

MEASURING PROGRAM EFFECTIVENESS

Measuring program effectiveness is important to:

- Show an outcome that demonstrates that the program met or exceeded the objectives.
- Help determine if the program needs to be adjusted or changed.
- Document and justify the need for continued funding or program expansion.
- Provide guidance for other communities looking to implement a similar program.

Program measures must relate to the objectives established for the program, and should include observable phenomena-things that can be seen and quantified. Outcomes to be measured could include:

- Number of crashes, injuries, and fatalities.
- Behaviours of pedestrians (such as looking, crossing, and yielding), and drivers (such as speeding and yielding).
- Citations issued/enforcement hours.
- Number of people walking.
- Knowledge, opinions, and attitudes.
- Changes in organisational activity/procedures.

CONCLUSION

In most industrialised countries, increases in road accidents have been associated with the increase in car ownership and usage. A large proportion of deaths and injuries occur to vehicle occupants. There is the need to develop comprehensive programs to reduce the incidence and severity of road accidents; these programs are based on a combination of engineering, enforcement, and education.

Urban traffic safety measures include improvements in infrastructure design (which are often informed by black-spot analysis), vehicle characteristics (particularly compulsory installation and use of safety belts [seatbelts]), and driving behaviour (such as blanket speed limits in urban areas and campaigns to discourage "drinking and driving").

These programs have been supported by a high level of agreement and coordination between different authorities under different ministries and with different budgets.

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