



**TOPIC 3**  
SAFETY ANALYSIS  
AND POLICY (SIG)

## **ROAD USER BEHAVIOUR AND SAFETY IN A DEVELOPING COUNTRY**

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### **Abstract**

The paper describes a methodology for investigating road user behaviour and safety in a quickly motorising urban area (Dhaka). The methodology consists of three components: 1) observational studies of road user behaviour, 2) questionnaires to assess road safety-related knowledge, and 3) discussion groups to measure underlying attitudes.

## **INTRODUCTION**

Mixing motorised and non-motorised traffic results in the twin problems of poor traffic flow and high accident rates. Similarly, inefficient use of the road system—poor road user behaviour—can be a major contributor to traffic problems, even where there is not a shortage in capacity of the roads. Indeed, the benefit of capital investments in road improvements is not fully realised unless there are improvements in road user behaviours such as lane discipline.

This paper is based on work undertaken by the author in 1993 as part of the Greater Dhaka Metropolitan Area Integrated Transport Study (DITS), a project funded by the United Nations Development Program. The terms of reference for this project emphasised enforcement as a means of improving road user behaviour. The need to look at the possibility of educational and other countermeasures aimed at improving road user behaviour was later acknowledged.

### **Traffic accidents in Dhaka**

Any statements about traffic accidents in Dhaka must be prefaced by the caveat that data sources are very poor and thus published figures are almost certainly underestimates. There is a need for improved collection of data about traffic accidents to allow identification of problems and monitoring of trends.

The magnitude of the problem of traffic accidents can be described in absolute terms or in rates. In absolute terms, the number of road deaths in Bangladesh increased from 432 in 1974 to 1,984 in 1986 (Gallagher, 1992). The Dhaka metropolitan area contributes between 10 and 20 percent of these deaths (Bangladesh Bureau of Statistics from Police reports, 1992).

The traffic risk (deaths per 10,000 motor vehicles) in Bangladesh increased from 73 in 1980 to 104 in 1986 (Gallagher, 1992). A more recent estimate is of 60 fatalities per 10,000 motor vehicles (World Bank, 1991). In contrast the traffic risk in many Western countries is about 2 fatalities per 10,000 motor vehicles.

### **The range of road users**

The level of safety of the road system is influenced by the behaviour of all road users, not just driver behaviour. Drivers comprise only a small proportion of road users in Dhaka, the capital of Bangladesh, and even their behaviour is strongly affected by the many other types of road users with whom they have to share the road. These other road users include:

- pedestrians
- hand-drawn carts (telegaris)
- bicycles
- rickshaws
- auto rickshaws (baby taxis)
- motorcycles
- cars
- tempos (motorcycles converted to small buses)
- small buses
- large buses
- trucks

Dhaka differs from cities in developed countries (and from many other cities in developing countries) in the extreme heterogeneity of its vehicle fleet. Most estimates of the vehicle fleet of

Dhaka conclude that there are more rickshaws than cars. It is quite likely that nonmotorised vehicles are more numerous than motorised vehicles.

The preponderance of nonmotorised vehicles in Dhaka has a number of consequences for both transport efficiency and safety. The motorised vehicles are larger, heavier and faster than the nonmotorised vehicles. Each of these differences has a particular effect. Because motorised vehicles are larger, they obstruct the vision of smaller vehicles and pedestrians to a greater extent than do nonmotorised vehicles. Because motorised vehicles are heavier (and faster), they cause greater damage when a collision occurs. The greater speed of motorised vehicles results in their path being frequently obstructed by slower moving vehicles causing traffic congestion and accidents.

### **Data needs to understand road user behaviour**

Three sorts of information are necessary to understand road user behaviour. First, it is necessary to have qualitative and quantitative information about the nature of the behaviour, its frequency and characteristics—to know *what* is happening. Knowing *what* is happening is not sufficient, however. In order to fully understand road user behaviour and have some possibility of changing it, one needs to know *why* the behaviour is occurring. Unsafe behaviour may result from a lack of *knowledge* or a lack of *motivation* to behave safely.

In this investigation an observational study was used to assess *what*, a questionnaire was used to study *knowledge* of the road rules and group discussions were conducted to examine the attitudes and *motivation* of road users.

## **STUDY OF ROAD USER BEHAVIOUR**

An observational study was conducted in which video recordings of road user behaviours were made and later analysed. Video recording was used in this study because many behaviours, some quite complicated, were of interest. Thus the ability to view the scene many times over and for scoring to be checked by an independent person were important.

### **Road user behaviours scored**

The study was primarily interested in behaviours reflecting breaking road rules and behaviours otherwise considered to be dangerous. The type of road user undertaking each manoeuvre was noted. The actual behaviours scored differed according to characteristics of each type of site. They included:

- pedestrian movements
- lane discipline
- occupant protection in motorcycles (helmets) and buses (travelling on the roof)
- turning movements
- failure to give way
- parking
- red light running

Each site was filmed for approximately 30 minutes during daytime.

### **Sites**

In order to facilitate site selection and classification, wherever possible, sites were selected from among those for which traffic counts were available. After a preliminary inspection, to check best

angles for video recording (overhead, elevated, ground level) the following sites were selected (see Table 1). Traffic counts were available from a DITS survey for six of the sites. The percentage of vehicles which were motorised was calculated.

**Table 1** General characteristics of sites video recorded for road user behaviour study

Site characteristic	Location	% of vehicles motorised
Mid-block divided	New Airport Road, south of Kemal Attaturk Avenue	97.6
Mid-block undivided	Satmasjid Road, Dhanmondi	50.0
Signalised intersection	New Airport Road at Mohakhali Rail Crossing	
Signalised intersection	Corner Mirpur Rd and Manik Mia Ave	61.2
Signalised intersection	Maghbazar	50.1
Unsignalised intersection (major-minor)	Corner unnamed road and Road 27, Dhanmondi	unavailable
Unsignalised intersection (minor-minor)	Corner Road 12A and unnamed road, Dhanmondi	unavailable
Roundabout	Sat Rasta	49.7

### **Road user behaviour problems which were identified**

The problem road user behaviours identified were grouped according to the types of road users involved. It should be emphasised that some problem behaviours may be a characteristic of a minority of these road users but even a minority behaving in this way can increase accident risk and/or cause traffic congestion.

#### *Pedestrians*

- walking on the road instead of the footpath
- not using zebra crossing or using inappropriately
- jaywalking
- walking within a roundabout

#### *All vehicles*

- failure to give way at roundabouts
- failure to give way at unsignalised intersections
- parking away from the kerb
- red light running
- multiple files when turning right
- travelling on the wrong side of the road

#### *Rickshaws and baby taxis*

- counterclockwise travel at roundabouts

#### *Baby taxis*

- straddling line markings

#### *Motorcyclists*

- riders failing to wear helmets
- pillion passengers failing to wear helmets

#### *Bus passengers*

- travelling on the exterior (particularly roof)

*Other problem road user behaviours which were informally observed but were not identified at the sites studied were:*

- travelling on the wrong side of the median
- unsafe overtaking
- failure to slow down when approaching an intersection

#### **Use of the horn**

The horn appears to be used much more frequently in Dhaka than in most other cities, particularly in western cities. Upon closer analysis, it was found that the horn was commonly used:

- to alert pedestrians who are about to step onto the roadway without having checked for the presence of vehicles
- to warn other vehicles when approaching an intersection where there is not sufficient visibility (either in absolute terms or relative to the speed that the vehicle is travelling)
- at signalised intersections the horn is often used to inform the lead vehicle that the light has turned green. This is because the placement of signals often prevents the driver of the lead vehicle from seeing the green light
- to signal to a slower vehicle to make way
- to express annoyance.

Apart from the last two reasons, the horn is generally used in a way that prevents accidents and also speeds traffic flow. Thus, while one would wish to change the situations that lead to the horn being used, it does not seem worthwhile at this stage to invest resources in attempting to reduce the use of horns (whether by enforcement or educational means). There are much more important and pressing problems to which those resources could be applied.

### **STUDY OF UNDERSTANDING OF ROAD RULES**

The survey aimed to assess the extent to which poor road user behaviour is a consequence of inadequate training, inappropriate rules and regulations or ineffective enforcement.

#### **Types of road rules**

Road rules were classified into those relating to driver licensing, vehicle registration and control of traffic.

##### *Driver licensing rules relate to*

- requirements for licences
- obtaining a licence
- disqualification

##### *Vehicle registration rules relate to*

- procedures for registration
- roadworthiness
- ways in which vehicles can be used

- third party insurance

*Traffic control rules relate to*

- speed limits and penalties for excessive speed
- turning and overtaking
- giving way
- procedures in the event of an accident

### **Questionnaire design and administration**

The issues of response bias, open or closed frame response and method of administration of the questionnaire were addressed in the design and administration of this study.

Response bias is a potential problem of questionnaires. It refers to the tendency of respondents to give what they perceive to be the type of response which would please the interviewer. This problem is potentially an important one because of the local custom of being agreeable, rather than necessarily giving an accurate answer. In addition, the extent of response bias might differ across road user classes because of status differences. This might result in artificial differences in responses of different road user classes.

Response bias was minimised by

- rewording of questions to make them less “leading”
- including additional questions so that the real interest of the questionnaire is less obvious
- reordering questions so that questions which might contaminate responses to later questions are placed near the end of the questionnaire
- use of interviewers who are as close as possible in status to the respondents.

Closed frame (multiple choice) questions were chosen for this study for ease of analysis. Piloting was undertaken to ensure that the options for multiple choice questions were understood.

The low level of literacy and small proportion of the population with private telephones in Dhaka meant that face to face, oral presentation, was the only practical method of questionnaire administration in this study.

Interviewers were requested to read out the question and then attempt to assign the verbal response to one of the multiple choice alternatives. For most questions, there was an “other” category. When a response fell into this category, the interviewer wrote down a summary.

Road rules affect the behaviour of all classes of road users, not just drivers. Yet there are some particular rules that apply only to some types of road user, eg heavy vehicles or motorcycles. Therefore seven versions of the questionnaire were prepared for administration to:

- 20 car drivers
- 21 bus drivers
- 20 tempo drivers
- 20 motorcycle riders
- 20 truck drivers
- 20 rickshaw pullers
- 20 baby taxi drivers

The bus driver and truck driver versions of the questionnaire contained additional questions about speed limits for trucks and buses. The questionnaire for motorcycle riders included items regarding helmet wearing. Questions about motor vehicle licensing were deleted from the version of the questionnaire administered to the rickshaw pullers.

### **Conclusions regarding knowledge of the road rules**

The questionnaire revealed a number of areas in which knowledge of the road rules was deficient. It also gave some indication of how this lack of knowledge should be targeted by road user education. These areas are summarised below:

- very few drivers learnt to drive from a driving school. This suggests that presenting educational measures through driving schools would not reach many new drivers
- very few drivers knew they could be disqualified for failing to stop after an accident. Publicising this penalty might result in more drivers stopping and thus improved road accident data.
- there was a lack of understanding of some road signs, particularly no overtaking, major road ahead and end of speed limit. This may be limiting the usefulness of these signs.
- drivers need to be informed that it is illegal to travel through a red light even if there is no other traffic and that there is a legal requirement for them to stop if a pedestrian is on a pedestrian crossing
- rickshaw pullers do know that they should travel clockwise around roundabouts. Enforcement or engineering measures, rather than education, are needed to ensure that they travel in the correct direction.
- the concept of legal right of way is not well understood. An educational campaign to teach this may have beneficial effects.
- many drivers are not aware that passengers are legally required to wear seat belts, where fitted
- many truck and bus drivers overestimated the maximum legal speed for their vehicles
- the greater stopping distance required by heavier vehicles is not understood by many truck and bus drivers

## **STUDY OF ROAD USER ATTITUDES AND MOTIVES**

### **Group discussions**

Structured group discussions were used to gather information about road user attitudes and motivations. This is because some of the information is sensitive and respondents were likely to feel less inhibited in a group than when alone with an interviewer.

Generally, discussion groups are most successful if the members are from similar backgrounds and have similar views. Strong disagreements among group members are unlikely to lead to fruitful information gathering. For this reason, each group was composed of a single class of road user. Thus the study included one group each of car drivers, rickshaw pullers, bus drivers, truck drivers, autorickshaw drivers and tempo drivers. The size of a discussion group was about eight to ten participants.

Participants all spoke Bangla and were not expatriates. Persons who had participated in the survey of understanding of road rules were not eligible to participate in this study because completion of that questionnaire may have affected their responses in the group discussions.

### **Conclusions from the group discussions**

Most road users considered road user behaviour to be the major cause of road accidents, particularly speeding, driving recklessly and overtaking. Improvements to enforcement were seen as the most effective solutions. Truck and bus drivers, however, were more likely to blame road conditions for the occurrence of road accidents.

The presence of nonmotorised vehicles and disobeying road rules were thought to be the most common causes of congestion.

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Small vehicles were identified as the most dangerous to travel in and the earlier findings that road users should give way to faster and larger vehicles were reinforced.

The role of passengers in pressuring rickshaw pullers to behave in a dangerous manner was also revealed in the group discussions.

A number of issues were not successfully communicated (eg advantages and disadvantages of medians), underlining the need for staff who are trained in interviewing and have a good understanding of road safety concepts to conduct successful group discussions in this area. Perhaps the use of pictorial material to aid in understanding may be useful in further, similar, exercises.

## **RECOMMENDED PROGRAMS**

In designing the programs outlined in this section, two important factors were taken into consideration. First, the combination of engineering, education and enforcement, implemented in that order has proven to be a very successful strategy for dealing with road user behaviour problems. Second, many road user behaviours which could be classed as problems are actually adaptive responses with respect to the current traffic situation. Changing these behaviours to ones which are more beneficial to the functioning of the traffic system as a whole may increase the risk and cause inconvenience to individuals unless changes are made to the traffic system.

The previous sections of this paper identified the problems of road user behaviour which contribute to accident risk and poor traffic flow in Dhaka:

- dangerous behaviour by and towards pedestrians
- failure to give way
- failure to obey traffic signals
- counterclockwise travel at roundabouts
- lack of lane discipline
- nonwearing of motorcycle helmets.

This section outlines possible measures that can be taken to counter these problems. Most measures have safety improvements as their focus but are likely to also improve traffic flow.

### **Road user education in schools**

The introduction of road user education in schools has significant potential to improve the road user behaviour of children in the short term and adults in the long term. It is most beneficial that road user education begins at the first year of schooling and continues until children leave school. In such an extended program, the emphasis necessarily changes. The focus for young children should be on safely crossing the road, older children can learn about safety on bicycles and as passengers and the oldest can be taught about skills relevant to driving.

Overseas experience has shown that road user education in schools is most successful where it is coordinated by a central organisation. This organisation ideally has representation from the government departments responsible for education and transport. The functions of the organisation are

- to design an appropriate road user education syllabus
- to produce and distribute road user education materials for use in schools
- to train teachers in road user education
- to monitor and evaluate the effectiveness of current programs to allow future improvements



In designing the syllabus and developing course materials, information could be requested from overseas countries. It is very important, however, to adapt any material to the special characteristics of traffic in Dhaka.

One potential constraint to the success of road user education in schools is the conflict between what children are being taught and what they observe around them, including probably the attitudes and behaviours of parents. A possible positive effect, however, is transfer of information from children to parents.

### **Pedestrian safety programs**

Pedestrians are traditionally considered to be the road user group most at risk of death or injury. Gallagher (1992) estimated that 43% of persons killed in Dhaka in 1986 and 1987 were pedestrians. Improvement of pedestrian safety requires countermeasures aimed at pedestrians, vehicle operators and the road environment.

At the level of attitudes and motives, pedestrians appear to underestimate their risk and vulnerability. There is evidence of a belief that traffic can and will stop. This results in safety and traffic flow problems.

The observational study reported earlier identified the following problem behaviours of pedestrians

- walking on the road instead of the footpath
- not using zebra crossing or using inappropriately
- jaywalking
- walking within a roundabout

An educational program for pedestrians should emphasise the simple behaviours of looking both ways before crossing the street and walking facing the traffic whenever possible. Trinca et al. (1988, p.95) comment that "the admonition that pedestrians should look both ways before crossing the street is relevant, sensible, and is ingrained in the behaviour of (surviving) pedestrians in motorised societies". These messages could be incorporated into publicity campaigns and school-based programs.

Further accident analysis (and better data) are needed to determine whether there is a significant problem of pedestrians being run over at night. If this is so, then an educational program should inform pedestrians of how difficult they are to see at night, despite the bright lights of motor vehicles and point out that they are more visible if wearing light coloured clothing.

Increased use of zebra crossings probably should not be promoted until after an educational campaign aimed at increasing the proportion of drivers who will stop for pedestrians on zebra crossings. Enforcement of stopping for pedestrians should be enforced, accompanied by advertising to increase the perceived risk of detection, and thus the deterrent effect. Additional education can be incorporated in school programs and driver training.

In the long term, a change is needed in the cultural attitude that the pedestrian is the road user with the lowest status before the risks of being a pedestrian will be lowered to an acceptable level. The rights of pedestrians should be featured in road user education in schools but such an ingrained attitude is likely to resist change.

A number of changes to the road environment have the potential to improve pedestrian safety. These include keeping the footpaths of major roads clear of obstacles which force or encourage pedestrians to walk on the road, fences to restrict pedestrians from crossing the road and pedestrian refuges.

Changes to the road environment are costly and cannot afford to be implemented on all roads. Thus it is necessary to identify which roads have the highest pedestrian numbers or have a large number of pedestrian accidents and target these locations.

### **Failure to give way**

Failure to give way was identified as a problem at unsignalised intersections and roundabouts. The Road Rules Study has shown that giving way is a concept which is poorly understood. Education about what this means needs to be incorporated into school programs, driver training and mass advertising. It is likely that a visual presentation of the concept would be more effective than a purely verbal presentation.

In the long term, there is a need to change the attitude that larger or faster vehicles have right of way. This is currently a view held by all sizes of vehicles. It would not be wise to encourage small vehicles to force their right of way, however, because disastrous results could ensue.

A number of changes to the road environment, in conjunction with education, could facilitate operation of the give way rule. These include lines to demarcate the edge of roundabouts, signs to indicate who has priority at locations which have been identified as particularly dangerous and clarification of which are major and minor roads.

In order to evaluate these countermeasures for failure to give way, there is a need to collect good location and vehicle-direction specific accident data. The Police should be encouraged to include sketches of the accident site, including vehicle movements, on all accident report forms. Incorporation of a numbering system for classification would simplify analysis. One such numbering system is the Definitions for Classifying Accidents system commonly used in Australia. A version of this classification which is simplified and tailored to the local vehicle mix could be developed.

### **Failure to obey traffic signals**

The road user movement survey and informal observations have shown that failures to stop at red traffic signals occur quite often. Fortunately, most vehicles do not continue through the intersection but stop and wait for a break in the traffic or the signals to change. Nevertheless, failure to stop at traffic signals is a dangerous behaviour and one which interferes with smooth traffic flow.

Red light running was very prevalent among bicyclists. An educational program is needed to inform bicyclists that they are vehicles and therefore required to obey traffic signals in the same way as all other vehicles.

There is potential for an educational campaign stressing the danger of running red lights. This would have greater chance of success if conducted in conjunction with a program of targeted enforcement.

Physical changes are also needed. Signals should be relocated so that they are visible to all vehicles. There is also the need to consider lengthening the cycle time or changing cycle in locations where there is a high proportion of nonmotorised vehicles. It may be that the inability to complete their manoeuvre within the green phase has encouraged rickshaws to ignore the red signal.

### **Counterclockwise travel at roundabouts**

Counterclockwise travel at roundabouts appears from the Road User Behaviour Study to be most common among rickshaws. This probably results from a desire to minimise expenditure of energy. Because of this strong motivation to continue the problem behaviour, it is unlikely that education and enforcement programs would be successful, except perhaps in the short term.

A potential engineering solution is a profiled treatment which allows easy travel in one direction but not the other. This might also be a candidate treatment for those roads with medians where travelling on the wrong side of the road is particularly common or for one-way streets.

### **Improving lane discipline**

Line markings were introduced in 1977/9 without any education on how they should be used. Informal questioning of road users has shown a lack of understanding of the purpose of lane markings and the meanings of broken, unbroken and double lines. The concepts are not difficult and could be communicated by a program of advertising. Another aspect of the advertising message could be the advantages of lane discipline to the road user, in terms of safety and transport efficiency.

Baby taxi drivers should receive special attention because of their tendency to straddle line markings. This is most inefficient from the point of view of traffic flow.

### **Use of motorcycle helmets**

There is a need to increase helmet wearing rates among motorcyclists and their pillion passengers. A combined program of education of motorcyclists and passengers about the benefits of helmets and the penalties for not wearing them and enforcement of helmet wearing is likely to be effective. In addition, the government could play a useful role by prohibiting motorcycle advertising which depicts riders or passengers not wearing helmets and by removing any tax on motorcycle helmets.

### **Travelling on the exterior of buses**

Travelling on the exterior, particularly the roof, of buses is a common phenomenon, particularly for long distance buses. There are a number of measures to discourage this which could be implemented in the short-term, such as fining conductors who allow passengers to travel on the exterior of the bus. However, the situation seems to be a result of current structural problems in the bus industry, particularly the shortage of buses. Reforms to the bus industry could be expected to reduce or eliminate this problem in the longer term.

### **General programs**

#### *Increasing seat belt wearing rates*

Seat belt wearing is a road user behaviour which does not affect the risk of an accident occurring but it reduces the severity of injuries sustained in an accident.

It is recommended that the program begin by capitalising on the promising level of voluntary seat belt wearing. Newspapers could be supplied with articles about persons whose lives were considered to have been saved by wearing seat belts. This approach has been found to be effective in a number of countries. The reverse is stressing that persons who were killed were not wearing a seat belt but this approach is less preferred because of possible privacy and legal objections.

Monitoring of wearing rates by means of surveys should be conducted and consideration given as to the timing for introducing legislation to make seat belt wearing compulsory. Legislation is only likely to be effective if wearing rates are already high because otherwise there are huge needs for enforcement which cannot be maintained in the long term.

Promotion and enforcement can increase seat belt wearing rates but they are limited by the number of seat belts that are fitted. For this reason, legislation should be introduced which requires seat belts to be fitted to all seating positions in cars (including four-wheel drives).

Seat belts in vehicles other than cars can have a benefit but there are many obstacles to their implementation and so it is recommended that the current program be restricted to cars.

### *Improving understanding of stopping distance*

The relationships of stopping distance to speed and mass are poorly understood by many road users. Yet the concepts are important for pedestrians and controllers of nonmotorised transport as well as car drivers. For this reason, education about these concepts should be aimed at all types of road users.

A moving demonstration of the relationships is likely to be better understood than a static one. If a broadcast television advertisement or cinema advertisement was not found to reach a large enough proportion of the population, a videotaped demonstration shown on a large format screen could be taken to markets etc. This would be likely to attract attention and reach many people.

The educational program should focus on relative speeds and distances, particularly for those road users who do not have access to speed measurements (eg rickshaw pullers, pedestrians).

### *Excessive speed*

Two aspects of excessive speed are amenable to educational measures, the effect of speed on travel time and fuel consumption. Because of their desire to maximise profit, these programs are aimed at truck and bus drivers.

### *Speed and travel time*

In most cities speeding has only a marginal effect on travel time. Delays such as general congestion, traffic signals and intersections contribute much more strongly to travel time. The aim of this campaign would be to point out this limited effect in order to try and reduce the amount of speeding which is an attempt to save time. Perhaps a local version of the hare and the tortoise fable might be appropriate.

Informal discussions suggest that passengers (car and bus) may direct drivers to speed, so this campaign should not be limited to drivers.

### *Speed and fuel consumption*

Travelling at excessive speed is commonly associated with increased fuel consumption. Perhaps an animated approach showing a fuel gauge dropping more quickly when the speedometer is showing a higher value (with appropriate commentary) might communicate this message.

## **Selection of countermeasures**

There are clearly more road user behaviour problems than can be addressed simultaneously. Even the set of recommended programs may require more resources than are available. Therefore there is a need to prioritise problems and countermeasures.

The techniques of cost-benefit analysis and cost-effectiveness analysis can be applied to select countermeasures. But data are needed to be collected to allow either of these calculations. In addition, cultural and economic factors should be considered in assessing of costs and benefits. The weights that should be applied to safety, traffic flow, cultural, employment, economic and other factors in making these decisions mean that they are ultimately political.

It is recommended that an interdisciplinary committee (road authority, Police, local government, transport industry, health department, education department) be established whose aim is to devise an accepted strategy which incorporates priorities. The strategy should set targets, for example, a 10% reduction in pedestrian casualties in the next five years or the target of 50% seat belt wearing rate of front seat occupants before 1995.

It is proposed that a single committee be responsible for deciding priorities for both road safety and traffic flow. This allows better coordination of the two aspects but care must be taken that the committee does not neglect one of the two issues.

## CONCLUSIONS AND RECOMMENDATIONS

Road user behaviour combines with vehicle and road characteristics to determine road safety. An understanding of the knowledge, attitudes and motivations which underlie the behaviour of road users is needed to understand why dangerous behaviours occur and how they may be avoided.

The surveys reported here showed a range of problem behaviours by each type of road user and identified knowledge and attitude problems which could underlie some of these behaviours.

Problems resulting from road user behaviour can be addressed by a wide range of strategies

- exposure control
- crash prevention
- behaviour modification (education and enforcement)
- injury control
- post-injury management

A set of programs was recommended to address the problems identified by these studies. The most important programs focus on

- pedestrian safety
- failure to give way
- failure to obey traffic signals
- counterclockwise travel at roundabouts
- lane discipline
- motorcycle helmets

The need to select among these programs and decide priorities is stressed. An interdisciplinary committee comprising the Road Authority, Police, local government, transport industry, health department and education department was recommended to devise an accepted overall strategy and set targets. To allow monitoring of the effectiveness of the programs, a comprehensive road accident data system is needed, along with the collection of exposure information.

Finally, there is a need to strike a balance between learning the lessons of other countries (and so not wasting resources) and considering the particular characteristics of traffic in Dhaka—both its vehicle mix and cultural factors—when designing programs to improve the safety of travel in Dhaka.

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