



ADB-ASEAN Regional Road Safety Program

Country Report:

CR 8



**Road Safety in
Singapore**



Asian Development Bank-Association of Southeast Asian Nations Regional Road Safety Program

Country Report CR 8: Singapore

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ABBREVIATIONS

AAS	Automobile Association of Singapore
BCDC	Bus Captain Driving Centre
GIA	General Insurance Association
IDAC	independent damage assessment center
LTA	Land Transport Authority
MOE	Ministry of Education
MOT	Ministry of Transport
PTC	Public Transport Council
SBST	SBS Transit Limited
TIBS	Trans-Island Bus Services Limited

CONTENTS

1	COUNTRY DESCRIPTION	1
1.1	General	1
1.2	Road Transport Network	1
1.3	Legislative Framework	2
2	ASSESSMENT OF ROAD SAFETY	3
2.1	Road Accident Definitions	3
2.2	Road Accident Reporting	3
2.3	Coverage of Road Accident Reporting	4
2.4	Data Background	4
2.5	Present Accident Situation	4
2.6	Consequences	8
3	RESPONSIBILITIES AND ACTIVITIES IN ROAD SAFETY	9
3.1	Ministry of Transport	9
3.2	Ministry of Education	9
3.3	Ministry of Health	10
3.4	Traffic Police	10
3.5	Road Authority	13
3.6	Driver Training Centers	14
3.7	Professional and Trade Associations	14
3.8	Public Transport Sector	14
3.9	Emergency Services	16
3.10	Universities	16
3.11	Private Sector	16
3.12	Insurance Association	16
3.13	Nongovernment Organizations	17
4	CONSTRAINTS	18
4.1	Legislative	18
4.2	Institutional	18
4.3	Technical	18
4.4	Education and Campaigns	18
4.5	Cultural and Demographic	18
4.6	Summary	19
5	BEST PRACTICES	20
5.1	Legislative	20
5.2	Institutional	20
5.3	Technical	20
5.4	Education	20
6	RECOMMENDATIONS	21
6.1	Legislative	21
6.2	Institutional	21
6.3	Technical	21
6.4	Education and Campaigns	21
6.5	Cultural	21
6.6	Summary	21
	APPENDIXES	23
	REFERENCES	30

Table 2: Vehicle Quota

Quota Year	Quota
May 2000–April 2001	109,452
May 2001–April 2002	89,295
May 2002–April 2003	99,136

Source: Singapore data.

Although there is a decrease in the vehicle quota, the number of new licensed drivers increased from 27,280 in 2001 to 34,318 in 2002 (Department of Statistics 2002).

Singapore has developed a well connected public transport system. On the roads, public buses and taxis are used to serve the travel needs of the population (Public Transport Council [PTC] 2002) (Table 3).

Table 3: Public Transport Information

Public Buses	
Routes	261
Fleet	3,395
Trips (daily)	More than 3 million passenger trips
Taxis	
Fleet	19,007
Trips (daily)	About 588,632

Source: Singapore data.

1.3 Legislative Framework

The Road Traffic Act is a comprehensive law regulating traffic, including vehicle licensing, driver licensing, vehicle engineering and inspections, vehicle markings, driving instructors, driving schools, and traffic signs.

Road standards are different depending on the agency that is designing and construction the road. In LTA, the Road Design Department is responsible for road design standards. The other agencies have their own design standards, but these are generally similar to LTA's design standards.

2 ASSESSMENT OF ROAD SAFETY

2.1 Road Accident Definitions

A road accident involves at least one vehicle within the road environment and results in the damage of property and/or injury to a road user.

In Singapore, accidents are classified into four severity categories: fatal, serious injury, slight injury, and property damage only (Traffic Police of Singapore 2003).

Box 2: Definitions of Road Accident Casualties

A **fatal casualty** is a victim who dies within 30 days of an accident.

A **seriously injured casualty** is a victim who suffers a fracture, concussion, internal lesions, crushing, severe lacerations, or severe general shock requiring medical treatment or hospitalization such that the person is unable to perform ordinary pursuits for at least 7 days.

A **slightly injured casualty** is a victim who is conveyed to hospital from the scene in an ambulance or otherwise and requires subsequent medical treatment entailing hospitalization and medical leave of no less than 3 days.

Note: Accidents are assigned to a severity group according to the most seriously affected casualty in an accident. All reported accidents not involving injuries are classified as property damage only accidents.

Source: Singapore data.

2.2 Road Accident Reporting

The Research and Planning Branch of the traffic police is responsible for collecting data on all injury accidents. The Research and Planning Branch is also

responsible for data processing and preparing accident statistics. In 1999, responsibility for recording noninjury accident data was transferred from the traffic police to the General Insurance Association (GIA), and GIA now holds data on 500,000 accidents that have occurred since 1999.

Accident data are collected on a form by traffic police and GIA. The traffic police accident data form for injury accidents captures the accident classification; date, time, and location of the accident; road traffic condition; road surface condition; weather condition; street lighting condition; collision type; driver condition; and details of accident vehicles and parties involved.

Traffic police investigators will collect accident data, and the forms are given to the Research and Planning Branch for processing. The data entry clerk from the Research and Planning Branch will enter the data into the Access Database, and the staff assistant will then generate the accident statistics. Access to the accident data is now limited, and only staff assistants and research officers from the Research and Planning Branch are able to access the database. The Research and Planning Branch will also send monthly copies of the database to LTA, where some additional analysis is undertaken.

The traffic police make use of the accident data to examine the causes of accidents and find ways to reduce these, especially at accident-prone locations. The traffic police also analyze fatal accidents and motorcycle accidents and produce bimonthly reports on accident trends. The internal statistical publications are sent to police headquarters, Ministry of Home Affairs, traffic police senior management, and all traffic police heads and OCs of respective branches and sections. External statistical publications, such as annual road safety accident statistical

reports, are normally released to the public.

For noninjury accidents, GIA collects data using a form that describes vehicle particulars, details of the person making the report, details of the owner, particulars of involved vehicles and drivers, date, time, place, traffic volume conditions, weather conditions, description of circumstances of the accident, and sketch plan and independent eyewitness particulars. For noninjury accidents, the forms need not be completed at the accident scene. The person making the report can complete it after leaving the accident scene. GIA data forms are scanned into a computer database but are not processed or analyzed any further, and the current method of storage does not permit any further analyses or manipulation. Data are kept for insurance claim and administrative purposes.

GIA publishes an annual motor statistical yearbook, which can be accessed by all members and selected nonmembers, such as lawyers. The data are used mainly for financial analysis by insurance agencies, rather than for road safety research. If these data could be made available, they could be a valuable resource in supplementing injury data at black spots, to improve understanding of accident causes at these locations and for accident costing studies.

2.3 Coverage of Accident Reporting

All injury road accidents are required to be reported to the traffic police. Therefore, fatal accidents and those involving serious personal injury are all almost certainly reported. However, based on a controlled sample survey of road traffic accidents undertaken at KK Hospital, some evidence suggests that slight injuries may not always be fully reported (e.g., when no vehicle collisions take place). Underreporting is examined in Appendix 3.

For noninjury accidents, no reports need to be filed with the traffic police. Instead, reports are made to the vehicle insurers of the affected party. These reports are then filed with GIA. The degree of underreporting depends on the level of property damage, which translates into the amount of accident claims. The application of an excess clause and the penalty of losing the no-claim bonus are deterrents to reporting an accident to the insurers.

In minor accidents, there is also a tendency for private settlement, due to special insurance packages offered by insurance companies for renewal if there are no accident claims in the previous year. However, all accidents involving government and military vehicles, even if there are no injuries, are reported to the traffic police.

2.4 Data Background

There are various sources of traffic accident data, but the most commonly referenced database is that maintained by the traffic police. All reported injury and fatal road accidents are captured in this database.

2.5. Present Accident Situation

The road safety situation in Singapore has improved over the years, and the recent trends and statistics are detailed in Appendix 2. Figure 1 and Figure 2 show, respectively, the changes in reported accident rates as well as in accident casualties in the last 25 years (Traffic Police of Singapore 2003). Damage only accidents are examined in Figure 3.

The initial rise in fatality cases in the late 1970s and early 1980s is largely a result of increased motorization in a period of economic expansion. Measures taken in the 1980s appear to have significantly reversed the accident trend.

Figure 1: Reported Injury and Fatal Accident Rates

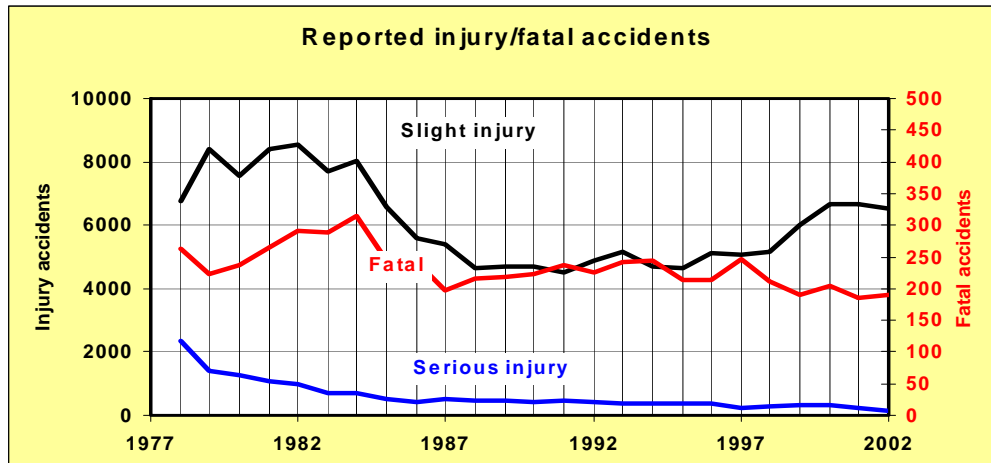


Figure 2: Reported Injury and Fatal Casualty Rates

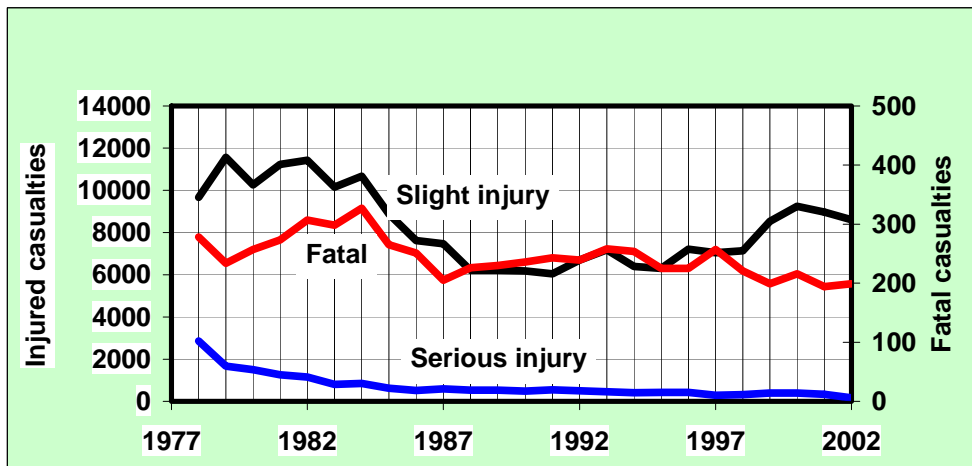
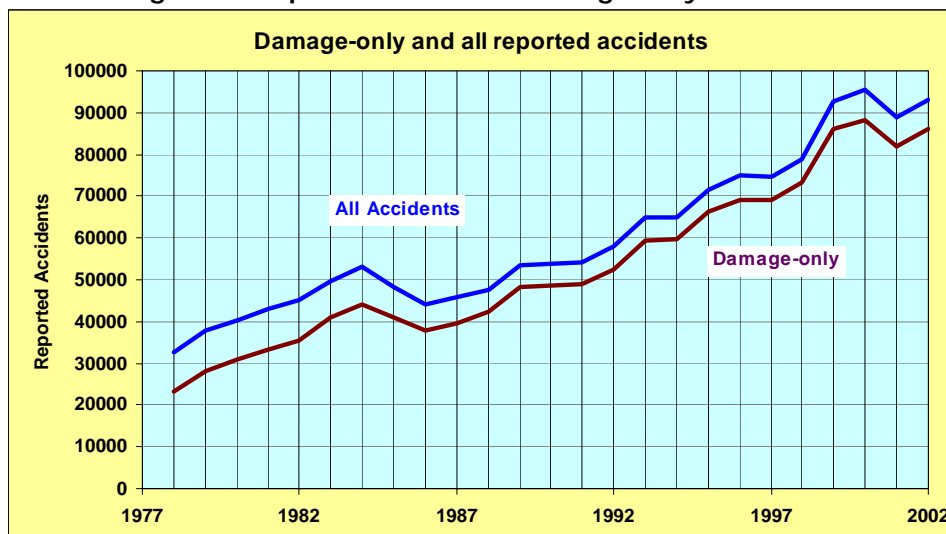


Figure 3: Reported Total and Damage Only Accidents



Noticeably, serious injury accidents and casualties have decreased steadily. This may be a result of better in-vehicle protection for passengers and drivers. Automobile ownership policies, which favor newer automobiles (those manufactured less than 10 years ago), and compulsory annual inspections of vehicles, to assess their roadworthiness, also contribute to the decline in the number of serious injury accidents.

While the number of fatality cases has dropped in recent years, the rate of reduction appears to be slowing down. The number of slight injury accidents and casualties has been somewhat contained in the last few years, after a decade of increase. This appears to still be a concern, as more vehicles are introduced onto the roads.

The number of damage only accidents, however, continues to increase (Figure 3). This indicates that vehicle collisions on roads are more frequent but that these are not resulting in injuries. The increase may be a result of a higher vehicle population and hence more travel.

Reported accident cases for 2002 are classified and presented in Table 4. There were 199 fatalities from 190 accidents—a slight increase of 2.6% over 2001. At the same time, there were 145 serious injury accidents, resulting in 172 serious injury casualties. There were 6,544 slight injury accidents, with 8,900 casualties.

Table 4: Reported Road Accidents (2002)

Type of Accidents	Accidents	Casualties
Fatality	190	199
Serious Injury	145	172
Slight Injury	6,544	8,900
Damage Only	86,191	—

— = no data available.

Source: Singapore data.

The fatal and serious-injury accident rates per 10,000 vehicles in 2002 were 2.7 and 2.1, respectively. The fatal and seriously injured casualty rate per 100,000 people was 4.8 and 4.1, respectively.

Among road users, motorcyclists and pedestrians are the most vulnerable. The number of motorcyclists and pillion riders killed in 2002 increased from 88 to 101, representing a 14.8% increase, but the corresponding number of injuries dropped by nearly 4.0%, from 4,811 to 4,637. In 2002, the number of pedestrians killed dropped by 4.0%, to 49, while the number of those injured increased marginally from 870 to 874.



Motorcycles in mixed traffic

Table 5 shows casualties by road user groups. Among fatalities, motorcyclists and pillion riders are the most represented, accounting for 45% of all road fatalities. They are the most vulnerable, as they also account for 52% of all people injured in traffic accidents. Of the motorcyclists killed in road accidents, 83% were Singaporeans, although non-Singaporeans are found to have a higher risk of becoming fatalities. A high proportion of fatal Singaporean casualties (12 of 82) were probationary riders, with less than 1 year of driving experience.

Table 5: Casualties by Groups (2002)

Road User Group	Fatality	Injured
Motorcyclists and Riders	101	4,637
Pedestrians	49	874
Pedal Cyclists	16	349
Private Vehicle Occupants	33	3,212
Others	15	1,046

Source: Singapore data.

Motorcyclist behavior remains a concern (Chin and Ang 2000 and Quddus et al. 2002). A total of 54,500 summonses were issued to motorcyclists by the traffic police for bad road behavior. More than 3,000 summonses were for speeding and 1,600 for running red lights.



Pedestrian safety remains a priority

There were 54 pedestrians killed on roads in 2001, accounting for 28% of road accident fatalities. Although in total there are not too many pedestrian accidents, this remains a serious problem because pedestrians are more vulnerable than other road users. There is a high tendency for pedestrians involved in accidents to be seriously injured or killed. Many pedestrians killed belong to the older age group (65 years of age and above). Among all pedestrians injured in road accidents, the most affected groups are the very young (under 15 years of age) and the very old (65 years of age and above) (Mitra et al. 2002).

Table 6 shows the distribution of fatalities by age. The elderly, especially those 65 years of age and above, are overrepresented in fatal cases. The elderly are generally poorer in judging the road environment and responding to any critical situations. There are also a high number of fatalities among young people, particularly those below 24 years of age. This is often associated with aggressive behavior and a tendency to take risks on roads.

Table 6: Distribution of Fatalities by Age

Age Group	Fatalities
14 and under	6
15–19	8
20–24	43
25–29	33
30–34	14
35–39	10
40–44	10
45–49	11
50–54	8
55–59	7
60 and above	49

Source: Singapore data.

Young drivers have a greater tendency to take risks, such as speeding and beating red lights. This may account for the high proportion of speed-related accidents. About 30% of fatal accidents were related to speeding. At the same time, the traffic police have issued nearly 38,000 summonses for speeding in 2001.

Of all the reported injury and fatal accidents, about 36% occurred at intersections, most of these with signals. beating red lights remains a serious problem (Lum and Wong 2003), with some 34,000 violations in 2001. In 2002, 10 and 505 people were killed and injured, respectively, due to beating red lights.

2. 6 Consequences

Over roughly the last 25 years, accident rates have generally declined significantly. However, the decline in fatality and serious injury cases is now slower than before, while slight injury cases are rising in recent years. Damage only accidents have consistently increased. This all means that road safety improvements have not been uniform. There are more conflicts on roads leading to increasing numbers of collisions. The use of more and better in-vehicle protection devices may have reduced the severity of accidents, so that the injuries that do happen tend to be less critical.

years of age and over). Young road users tend to exhibit risk-taking behavior. Poor road behavior is seen in the large number of serious violations in speeding and running red lights. The old, with their weaker faculties, are also subject to higher risk of being involved in accidents. Given their weaker physiques, they are more likely to succumb to injuries when involved in road accidents.



Motorcyclists are vulnerable on roads

However, these in-vehicle protection devices do not seem to benefit vulnerable road users. As in many countries, the most vulnerable road users groups on Singapore's roads are motorcyclists, cyclists, and pedestrians. After nearly a decade of decline in motorcycle fatality rates, motorcycle accidents increased by about 15% in 2002.

At the same time, the very young and the old are also more at risk than other road users (Quddus et al. 2001). There is a need to examine the behavior of these vulnerable groups, design ways to instill safer driver behavior among these road users, and create safer facilities to assist them.

The other groups of road users who are more accident-prone are the young (under 24 years of age) and the old (65

3 RESPONSIBILITIES AND ACTIVITIES IN ROAD SAFETY

3.1 Ministry of Transport

MOT oversees the development and regulation of civil aviation and air transport, maritime transport and ports, and land transport. MOT's functions are to set strategic and policy directions and, through its statutory boards, ensure that operations and regulatory functions are being carried out. Under the land transport portfolio, there are two statutory boards: LTA and PTC, but the latter does not look into road safety matters.

3.2 Ministry of Education

The Ministry of Education (MOE) has included road safety education in its curriculum for primary school students, starting from the first level, and all primary five students have to participate in the traffic games held at Road Safety Park. The curriculum includes pedestrian safety, cyclist safety, causes of road accidents, use of traffic lights, and safety on public transport. Formal education and the traffic games create road safety awareness and encourage good habits at an early developmental stage. These also provide students with a better understanding of road rules and their relevance to road safety.

In addition to formal classes, students are given practical classes on road safety. Some of these other road safety activities are conducted by schools at assembly talks and exhibitions.

For school staff members, MOE provides school principals with a handbook on procedures to take in the event of an accident. The standard operating procedures to take when dealing with road accidents are circulated to teaching and nonteaching staff members at the beginning of each school year and are

placed at strategic locations for reference. The handbook also provides guidelines that will assist school principals in planning and developing their own road safety programs and activities.

The School Development Office in MOE advises schools on the provision of road safety features within school compounds, especially during the construction of new schools.

MOE keeps a record of all accidents (including road accidents) that occur in and around school compounds. Accident data are collected using a form that describes the type and location of each accident. Schools are responsible for writing accident reports, which are sent to MOE for evaluation. MOE compiles accident data and sends information related to road accidents to schools as educational materials that promote road safety.

MOE works in partnership with traffic and neighborhood police in promoting road safety education in schools as well as in controlling traffic during school events. In 1998, MOE and the traffic police held a seminar for all schools, highlighting school-based road safety projects and reinforcing the importance of road safety through talks by traffic police officers, neighborhood police officers, and psychologists.

To ensure students' safety on roads, school officials are constantly looking for unsafe road conditions. Schools work together with LTA's Traffic Management Department to design and install safety devices that provide a safer road environment for students.

MOE also conducts ad hoc meetings and discussion sessions with traffic police and LTA officials to voice the needs of the schools regarding traffic problems, including road safety and other joint programs.

3.3 Ministry of Health

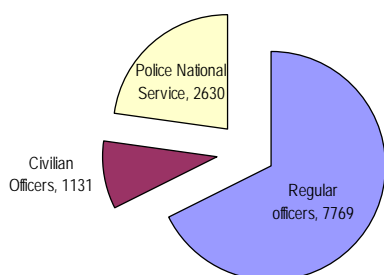
The Ministry of Health is responsible for ensuring that health care in Singapore is characterized by good clinical outcomes and professional standards and that services delivered are appropriate to each patient’s needs. The Ministry of Health also ensures that health care remains affordable to Singaporeans.

Individual hospitals maintain their own medical records of admitted victims of injury accidents. A central trauma register is being considered. Road accidents are now seen as a significant burden on scarce medical and health resources and are the biggest killer of people under 40 years of age in Singapore.

3.4 Traffic Police

Traffic police are members of a special department in the Singapore Police Force. They are responsible for maintaining law and order on the roads and promoting road safety by influencing the behavior and skills of roads users. The full-time staff strength consists of approximately 11,500 operationally ready people (Figure 4). In addition, there are about 21,000 police national servicemen and about 1,300 volunteer special constabulary officers.

Figure 4: Operationally Ready Full-Time Staff



The Traffic Police Department is divided into eight subdepartments (Figure 5), and there is a system for rotation of duties among the junior officers only.

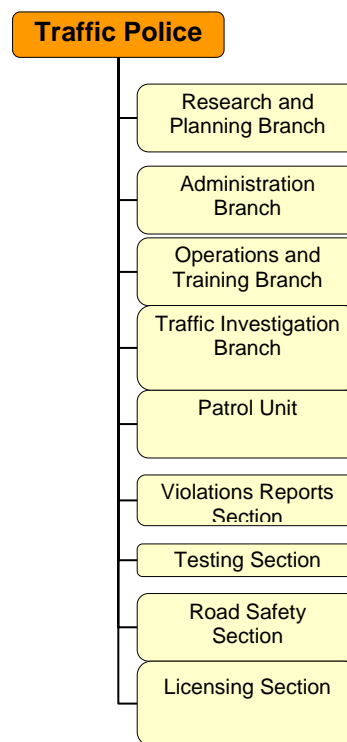


Figure 5: Traffic Police Organization Chart

The Research and Planning Branch is responsible for creating strategies that influence the direction of traffic policies and major projects, such as the New Driving License project, the various camera systems around the island, and the Traffic Warden Scheme. The Research and Planning Branch is in charge of the collection of accident data and processing this data. The accident data collected are used to generate accident statistics for planning road safety programs.

The Administration Branch deals with human resources and finance issues, staff welfare, customer service, logistics, information technology and administrative support, and the Registry of Vehicles. The Operations and Training Branch plans and executes all traffic operations and training initiatives of the Traffic Police Department.

The investigators in the Traffic Investigation Branch investigate road traffic accidents involving death and injury, as well as serious violations. After a road accident, the investigators are the ones who will put up the accident data forms, while the Research and Planning Branch processes the data for further analysis. The investigators are assisted by officers from the Patrol Unit, who are the first deployed at the scene of an accident. These officers complete the initial assessment of an accident. The Patrol Unit has four core patrol teams and one special team (i.e., Task Force) in charge of day-to-day enforcement of traffic rules and regulations, conduct of special operations, and provision of outrider escorts.

The Violations Reports Section is made up of the Processing Unit (violation reports), the Warrant Unit (enforcing warrants of arrest), and the Camera Unit (red light surveillance and radar speed cameras). The number of traffic summonses issued has been decreasing in the last 3 years, with a total of 285,177 summonses issued in 2002, compared with a total of over 400,000 summonses issued in 2000. The offenses are classified into three categories: moving, parking, and pedestrian offenses. Moving offenses involve offenses of drivers while driving on roads, including speeding, improper conduct on the road, and failure to control vehicles properly.

Some of the more common traffic offenses are speeding and running red lights. Although the total number of summonses issued has decreased, speeding offenses have increased by nearly 520, with 37,562 summonses issued in 2001, compared with 37,043 summonses issued in 2000. Speed-related fatal accidents have also increased, from 67 cases in 2000 to 68 cases in 2001. Fatal accidents resulting from running red lights violations decreased, from 18 fatal cases in 2000 to 13 cases in 2001. The high number of

casualties and offenses involving motorcyclists is a concern, and the traffic police are working to reduce accidents involving this vulnerable group of road users.

Table 7 outlines an approach to improve road safety. Table 8 shows the number of summonses issued for 2000–2002.

Table 7: Three-Pronged Approach by Traffic Police to Improve Road Safety

Approach	Action to be Taken
Enforcement	<ul style="list-style-type: none"> ▪ Regular patrols ▪ Special operations ▪ Enforcement blitz
Education	<ul style="list-style-type: none"> ▪ Visible road safety public education campaigns ▪ Road safety talks to schools in other external organizations ▪ Road safety exhibitions in schools and external organizations
Legislation	<ul style="list-style-type: none"> ▪ Response to road user behavior and changes in environment.

Source: Singapore data.

Table 8: Number of Summonses Issued (2000–2002)

	2000	2001	2002
Moving	149,824	147,721	106,903
Parking	256,242	215,117	177,525
Pedestrian	696	1,076	749
Total	406,762	363,914	285,177

Source: Singapore data.

There is also a system for demerit points for certain offenses, such as speeding and running red lights, and motorists will be suspended if there is an accumulation of 24 points within 2 years. The suspension period depends on the frequency and seriousness of the offense, and suspensions can last between 3 months and 3 years. For suspension periods that last 1 year or

longer, the driver has to retake and pass the driving test before being issued a new license. For new drivers who accumulate 13 or more demerit points within the first 12 months, the license will be revoked, and the new driver has to retake and pass the driving test. Certain traffic offenses can result in the court's disqualifying drivers from driving. Driving while intoxicated or causing death by reckless or dangerous driving are offense that can result in disqualification. Such offenders have to retake all theory and the practical test if disqualification lasts for more than 1 year. Table 9 shows the number of licenses suspended, disqualified, or revoked during 2000–2002.

Table 9: Number of Licenses Suspended, Disqualified, or Revoked

	2000	2001	2002
Suspended	785	846	468
Disqualified	2,797	3,663	3,075
Revoked	232	260	133

Source: Singapore data.

The Testing Section, together with four testing centers, sets training standards for driving centers and private instructors. To ensure that drivers are safe and skillful, testing standards are high and continuously monitored and reviewed to ensure effectiveness. The traffic police also have retraining courses for suspended drivers to attend at driving centers.

The Licensing Section is responsible for issuing licenses to drivers. There are eight classes of licenses based on the type of vehicle, and there were a total of more than 2.08 million qualified driver's license holders at the end of 2002. The legal driving age is 17. There is no upper age limit for motorcyclists and automobile drivers, but there is an upper age limit of 70 years for heavy automobiles and heavy goods vehicles, as well as taxi and bus vocational license holders. It is also necessary for these drivers to pass a medical test and

proficiency test annually, from the age of 65. Motorcyclists and automobile drivers are required to be certified medically fit to drive once every 3 years, starting at the age of 65. This becomes more important with the introduction of the new lifetime driver's license.

The Road Safety Section takes charge of public road safety education. It works hand in hand with various community groups to promote road safety for all road users. The traffic police reach the masses using

- television commercials;
- radio commercials;
- newspaper advertisements;
- cinema advertisements;
- bus and taxi advertisements;
- publicity materials, such as leaflets, banners, posters, and stickers; and
- Internet and information communication technology.

The road safety activities that are conducted annually are the Road Safety Outreach, Road Courtesy Campaign, and Anti Drink Drive Campaign, which are held during the festive period toward the end of each year and the beginning of each new year.

In the last few years, the traffic police have conducted more than 200 road safety talks annually, reaching about 100,000 people every year. The road safety talks are for all road users, including motorists, motorcyclists, pedal cyclists, and pedestrians (especially the young and the old).

There are also targeted groups, such as young drivers and riders, where the traffic police have produced a new road safety video called *Road Safety—Every Road User's Responsibility*, which highlights the consequences of road accidents and is seen by all new license holders at all driving and testing centers. The video highlights the pain and suffering of road accident victims as a

deterrent to unsafe driving, especially for new and inexperienced drivers.

Another target group includes schoolchildren, where the traffic police in collaboration with MOE conduct road safety training at the Road Safety Community Park for all primary 5 students. This compulsory training aims to educate students in road safety.

Under the Community Safety and Security Programme, the traffic police together with LTA have developed the Safe Drive Zone community-based road safety program. The traffic police provide training to volunteers for Safe Drive Zone community wardens, while LTA looks into road reengineering and improvement.

3.5 Road Authority

The road authority in Singapore is LTA, a statutory board under MOT. LTA is responsible for land transport developments in Singapore. LTA plans, designs, constructs, operates, maintains, and regulates land transport infrastructure and systems. LTA was established in September 1995 through the merger of four public sector entities:

- Registry of Vehicles,
- Mass Rapid Transit Corporation,
- Roads and Transportation Division of the Public Works Department, and
- Land Transport Division of the then Ministry of Communications.

LTA is divided into eight divisions:

- Roads Division,
- Engineering Division,
- Projects Division,
- Vehicle and Transit Licensing Division,
- Information Technology,
- Policy and Planning Division,
- Contracts and Process Division, and
- Corporate Services.

LTA has established the Road Safety Engineering Unit to ensure good and sound engineering practices, enhance

road safety, and work with other agencies involved in road safety. This unit carries out work such as accident investigation and prevention and road safety audits and community-based safety programs (such as Safe Drive Zone).

Within LTA, there is also the Safety Assurance Department, under the Contract and Process Division. It is independent of the LTA departments responsible for planning, designing, and implementing projects. The Safety Assurance Department is responsible for the implementation and overall management of the Project Safety Review process within LTA (Safety Department 2001).

In 1998, LTA implemented the Road Safety Audit process, where all projects that involve physical changes to the road system have to be reviewed at the planning, design, construction, and pre- and postopening stages. Apart from projects, this process affects existing roads.

LTA has its own road design standards that incorporate safety.

Under a memorandum of understanding signed in 2000, the traffic police provide LTA with accident data collected, and LTA's Road Safety Engineering Unit uses the data to spot accident trends and develop mitigation measures for potential hazards. LTA is in the process of developing an accident black spot program that will be in place in the future.

LTA educates its staff by sharing lessons learned from projects through its quarterly newsletter. LTA conducts training courses for the individual departments on understanding the Road Safety Audit process and using case studies to point out common safety problems.

Although very active and strong in the areas of preventive safety, through its safety audit system and safety review processes, LTA has not yet developed the ability to identify, analyze, and improve hazardous locations on the existing network. This needs to be done urgently.

3.6 Driver Training Centers

There are three driver training centers in Singapore:

- Bukit Batok Driving Centre,
- Comfort Driving Centre, and
- Singapore Safety Driving Centre.

Driving centers are responsible for training of drivers as well as conducting retraining courses for suspended drivers. Driving centers are also responsible for testing drivers, in collaboration with the traffic police.

Driving instructors at driving centers are highly qualified and are closely monitored by the traffic police. The centers make use of structured theory and a practical course, as well as driving and riding simulators, in their teaching program.

3.7 Professional and Trade Associations

The Automobile Association of Singapore (AAS) supports the motoring public in Singapore, especially its over 80,000 members. It provides its members with vehicle recovery service for disabled vehicles and a wide range of motoring-related services. AAS has a general committee that meets monthly with co-opted members from LTA, Ministry of Defense, and traffic police. AAS recently initiated safety programs, such as the campaign for the greater use of rear seat belts and child restraints. AAS has a close working relationship with Malaysian and Thai counterparts and with Thai tourism and police officials, who provide escort services for motoring ventures.

For motorcycle enthusiasts, there are motorcycling clubs, such as the Storm Riders, that meet weekly. Club members promote motorcycling as a sport, share knowledge, and encourage safe riding on roads by incorporating a sense of social responsibility into activities.

The Singapore Logistics Association helps promote and enhance Singapore as a reliable regional logistics center with high standards in logistics practice and management. The Singapore Logistics Association's Land Transportation Committee examines and addresses policies and operational issues affecting domestic transportation and distribution, including safety.

The Chartered Institute of Logistics and Transport is a professional body for those who engage in transport and logistics—including all sectors of industry, namely, air, sea, and land transport and logistics—for passenger and freight transportation. The Chartered Institute of Logistics and Transport is actively involved in promoting road safety, having undertaken several road safety projects. A recent road safety project is to improve the visibility of long and heavy vehicles by upgrading the standards for rear and side markings.

3.8 Public Transport Sector

PTC is a statutory board under MOT, and its functions are approving bus services, regulating bus service standards, and approving bus and train fares. PTC is not playing any particular role in road safety.

The two main public bus operators in Singapore are SBS Transit Limited (SBST) and Trans-Island Bus Services Limited (TIBS). They have very strong in-house training programs that emphasize safety among all staff members.

SBST's Safety Policy Statement outlines the company's strategies and objectives

in safety management. It has a well organized system covering different levels. At the management level, there is a safety steering committee with districts. Each district has its own safety committees, down to route groups. Each route group has a safety subcommittee for the rank and file. SBST's Safety Department is responsible for implementing safety practices for the daily overall planning and supervision of its operations. Besides the Safety Department, all the other departments in bus operations also contribute to safety efforts.

SBST has its own Bus Captain Driving Centre (BCDC) to train and upgrade the driving skills of its bus drivers. At BCDC, the bus captains are also taught defensive driving techniques. SBST has set up a cycle of training that allows bus captains to be rotated back to BCDC to upgrade their driving skills. Remedial training is available for those who are not performing properly.

The Safety Department is also responsible for maintaining accident data, which are used for accident investigations and for analysis of accident trends. There has been steady improvement in safety performance over the years, with an accident rate of 0.95 accident per 10,000 km in 1995, improving to 0.60 in 2002 (an improvement of 36.8%). In 8 months of 2003, the average rate improved again, to 0.54.

SBST contributes to community safety by working with the People's Association and individual schools to conduct safety talks at community centers and with schoolchildren. SBST also supports the traffic police in ad hoc safety activities.

TIBS's Safety Policy is backed by its chief executive. TIBS's Traffic Safety Committee comprises representatives from Depot Operations, Human Resource Development Department, and Service Quality Unit. The purpose of the Traffic

Safety Committee is to conduct safety audits and checks, review safety goals and policies, and administer safety programs to stimulate employees' interests in safety. TIBS meets regularly with representatives of the Housing and Development Board, LTA, traffic police, and others to discuss safety issues.

In 1998, TIBS introduced the Safe Driving Supervisor Scheme to create greater safety awareness and enhance safe driving skills and techniques of drivers and frontline staff members.

TIBS has developed a comprehensive safety training program that starts the day each driver joins the company. All new trainees have to undergo a 24-day service proficiency training course, where defensive driving and customer service techniques are taught by traffic police officers before the test is undertaken. Upon passing the test, the new service captains will receive about a week of coaching by mentor service captains before assuming driving duties independently. TIBS schedules those service captains who have served for more than 1 year to attend an advanced safe driving techniques course, where up-to-date defensive driving techniques are taught. TIBS also keeps tabs on those service captains who commit traffic offenses. Those who accumulate two traffic offenses in 1 year are recalled for a 3-day driving skills enhancement course.

TIBS rewards its service captains for safe driving, financially and with recognition, through awards such as the Accident-Free Award Scheme.

TIBS's buses are equipped with safety features that improve passenger safety. These features include sensitive-edge retractable doors that retract upon contact with an obstruction during closing, infrared sensing devices that prevent doors from closing when there are passengers standing on the steps at the exit, and accelerator-interlock

devices that prevent accelerators from being depressed when entrance and exit doors are not fully closed. The buses are also sent to workshops for regular checks and maintenance under a comprehensive preventive maintenance program.

3.9 Emergency Services

The Singapore Civil Defence Force provides ambulances to bring accident victims to hospitals. Hospitals also have their own ambulance services; there are also private ambulance services. In 2002, it took ambulances less than 11 minutes to travel from hospitals to accident scenes 75% of the time. Efforts are now under way to increase this to 80% of the time. The travel time to hospitals from accidents varied from 11 to 15 minutes.

Ambulances usually arrive at accident scenes within 30 minutes of being called. The traffic police are also at accident scenes to offer assistance.

3.10 Universities

There are two established universities in Singapore, the Nanyang Technological University and the National University of Singapore. Both universities have carried out research work related to road safety over the years. Numerous papers have been published in international journals and presented at international conferences.

3.11 Private Sector

There are a few multinational companies in Singapore that have strong safety cultures. Private companies, such as 3M and Shell, are regular sponsors of road safety campaigns and activities, and other private sector sponsors often support specific initiatives and safety campaigns of interest to them.

3.12 Insurance Association

The General Insurance Association (GIA) was formed in 1965, when Singapore became an independent republic. GIA has standing committees, including its Motor Committee, which carries out the activities of the association.

In 1999, GIA took over the responsibility of collecting noninjury accident data from the traffic police. GIA's records management center maintains all noninjury accident records.

In August 2001, following recommendations by the Motor Insurance Task Force, GIA established a network of independent damage assessment centers (IDACs) across Singapore. There are currently 11 IDACs on the island. IDACs were created to give a fair and professional assessment of accident damage to motor vehicles and record the assessments made. IDACs also provide tow truck service, should motor vehicles become immobilized after accidents.

There is also the Insurance Dispute Resolution Organisation, which provides an affordable service for people who do not have the means to go to court or do not wish to pay hefty legal fees. It is an independent organization chaired by a retired supreme court judge and includes one member from AAS; Consumers Association of Singapore; GIA; and Life Insurance Association, Singapore. The composition of the Insurance Dispute Resolution Organisation ensures a balanced representation for the insurance industry and consumers.

3.13 Nongovernment Organizations

The National Safety Council of Singapore, founded in 1966, has been playing an important role in developing safety in Singapore. The council is concerned with various aspects of safety, such as industrial, home and road safety, and has been active for many years in publicity campaigns and road user education initiatives. It receives donations from private companies and a small grant from the Ministry of Home Affairs for its activities.

In recent years, the council has organized motorcycle rallies to promote the development of safer riding skills among motorcyclists. It has also conducted defensive driving courses, but these have now been undertaken by driving schools.

4 CONSTRAINTS

4.1 Legislative

Road safety is not given much priority, and unsafe roads are usually attributed to the problem of bad driver behavior. As such, there are limited funds and resources to carry out road safety work. There is no central government body in Singapore to coordinate and promote road safety. Individual organizations usually take the initiative regarding road safety training, education, and promotion.

4.2 Institutional

The juridical system has been very effective in prosecuting negligent drivers, and serious law offenders are heavily punished. However, pedestrians and pedal cyclists seem to be immune from prosecution, and they have a tendency to ride or amble across roads and junctions as and when they like and not at dedicated locations.

Accident data collected by GIA and traffic police are mainly for internal use and are seldom shared with the public. Although the Traffic Police Department publishes accident statistics that are available to the public, further analysis needs to be conducted by professionals and safety experts to study accident data more scientifically.

Noninjury accident data collected by GIA are not processed but merely kept for record and administrative purposes.

There is a lack of proper communication and coordination among different agencies involved in road construction and infrastructure, resulting in abortive work or expensive remedial actions at a later stage.

With increasing car prices in Singapore, it becomes more difficult for people to purchase motor vehicles. However, people will still take driving lessons and

pass the driving test, but many will not drive after getting licenses.

4.3 Technical

Road design standards are generally good, with safety being incorporated into these. The problem usually lies with the combination of various standards resulting in unsafe design.

Currently, the LTA requirements related to temporary traffic diversion safety audits (or reviews) are only for those that will be in place for 6 months or longer, and there is no requirement for any form of road safety audit for other temporary traffic diversions.

4.4 Education and Campaigns

The Traffic Police Department relies heavily on private sector sponsorships to fund its road safety programs. With the economic downturn, the Traffic Police Department faces difficulty getting sufficient funding to run its road safety programs. Moreover, there is also much sensitivity involved in planning road safety campaign concepts and topics.

There is no evaluation of the effectiveness of road safety programs by all organizations.

4.5 Cultural and Demographic

Singapore's drivers do not follow the speed limit, and they do not pay much attention to stop signs. This may be due to the excessive and, at times, inappropriate use of signs where they are not necessary. Also, speed limits are not always a true reflection of the safest speeds.

As the population ages, there will be more elderly people using the roads, either as drivers or pedestrians. The vulnerability of the elderly is seen as a factor in the higher proportion of road accidents. More must be done to address problems associated with the elderly. For

example, road signs may have to be better positioned and made more conspicuous, to accommodate the slower response time and poorer eyesight of older people. Better and more at-grade crossing facilities may also have to be provided to enhance safety for older people when crossing roads.

4.6 Summary

In many aspects of life in Singapore, the people are highly disciplined, orderly, and law-abiding. While this has served the country well in achieving a high standard of road safety, further improvements in road safety appear to be not as easy as some might think.

The demand for road and personal space and the high costs of transportation have made many Singaporeans more aggressive on the roads. Unless individuals understand the social responsibility toward safety and begin to act safely on roads, the effort to promote a safer environment will become increasingly more difficult. A change in the mind-set of all road users must be made.

Such a change in mind-set must begin with the authorities responsible for promoting and enforcing road safety. For a start, there must be greater coordination and dialogue among the stakeholders. There should be greater sharing of information for the determined purpose of reducing traffic accidents and correcting bad road user behavior.

A significant amount of accident data is available for study and analysis, but the data are seldom made use of, largely because of lack of expertise or funding. In many cases, the reluctance to share information has stifled initiatives that could result in potential breakthroughs in safety understandings and practices.

To make quantum improvements in safety, actions must be more focused on

dealing with at-risk groups. However, identifying relevant groups and real causes of accidents remains a challenge. To move forward, more funds must be devoted to traffic safety research. Currently, no obvious funding agency or dedicated funds are allocated for road safety research.

5 BEST PRACTICES

and these are included in the principal's handbook.

5.1 Legislative

The Government has done well controlling vehicle roadworthiness through its 10-year car scheme and regular vehicle inspections at independent centers.

5.2 Institutional

Traffic police monitor driving instructors closely, and test standards are very high. Driving schools have very comprehensive theory and practical lessons for people learning to drive, and riding and driving simulators are used in training courses.

Traffic police are highly efficient and have noncorruptible violation enforcement on the roads.

AAS works closely with its Malaysia counterparts and Thai tourism and police officials to ensure road safety on trips from Singapore to Thailand through Malaysia.

5.3 Technical

The road standards in Singapore are generally good. To further improve road safety, LTA introduced in 1998 the process of road safety audits for road projects. An evaluation process that makes use of the road safety audit procedure to promote a culture of safety has been proposed (Chin and Tan 2002).

5.4 Education

MOE has included road safety in the primary school curriculum, and all primary 5 pupils have to go through a practical road safety circuit to enhance their understanding of the importance of safe practices on roads.

MOE has also drawn up comprehensive guidelines on standard operating procedures in the event of an accident,

6 RECOMMENDATIONS

6.1 Legislative

Road safety issues are currently dealt with in several government ministries. The Road Traffic Act, which has portions dealing with safety matters, is handled by both the Ministry of Home Affairs and MOT. A central coordinating committee or body that brings together representatives from various ministries should be considered.

6.2 Institutional

The judicial system should look into prosecuting pedestrians and cyclists and giving them heavier punishments for traffic offenses involving dangerous or illegal behavior.

The nonconfidential GIA and traffic police accident data could be shared with other organizations for research purposes. The noninjury accident data collected by GIA should be processed and stored electronically for future analyses.

Road designers and builders should improve communication and coordination efforts during the planning and construction stages of road projects.

6.3 Technical

Road safety audits should be conducted for all temporary traffic diversions every 6 months, instead of the current practice of auditing designs only if temporary traffic diversions are to be in place for more than 6 months.

The rear and side markings for long and heavy vehicles should be upgraded for better visibility at night.

Motorcyclist conspicuity should be enhanced through legislative and educational means.

6.4 Education and Campaigns

Safety programs should be evaluated at the end of each program to determine the effectiveness in promoting road safety and whether there is any reduction in accidents and the risk faced by target groups.

6.5 Cultural

To change the mind-set of road users in Singapore, road designers should be more careful when planning signs and setting speed limits.

6.6 Summary

Road safety stakeholders in Singapore seem to function well individually in promoting road safety. Relationships and cooperation among various stakeholders could, however, be improved. Working groups and committees deliberating on road safety issues should be formalized and better coordinated.

For a start, there should be a higher level of road safety awareness. This must begin at the management level of road and traffic authorities, who must be more open to suggestions for safety improvements. Justified expenditures to promote road safety should be viewed as investments with high economic returns, rather than as mere costs related to the road system.

Many activities promoting road safety have to be based on the accident data collected. A significant amount of data related to accidents is potentially usable and available. Unfortunately, there are problems associated with the quality of data and data access issues. There should also be more regular forums encouraging the exchange ideas on safety research and safety promotion.

There is a lack of follow-through in many safety promotion schemes. Few if any evaluation studies have been undertaken

to assess the effectiveness of safety schemes. There appears to be funds available for safety promotion but not any for evaluation.

Planners and designers of any safety system must be conscious of the changing road system and road users. To adopt a more proactive view of safety, they must anticipate what will be needed in the future. One important issue is the aging population, which will affect drivers and pedestrians. Safer and more accommodating transport facilities for the elderly should be looked into. The design of traffic control devices, road crossing facilities and signs may have to be reexamined to take into account the needs of the elderly.

Appendix 1 Key People and Organizations

Category	Organization	Key Road Safety Personnel
Government Sector	Ministry of Transport	J. Wong <i>Director, Land Transport Division</i>
	Ministry of Education	J.C. Seah <i>Director, Schools Division</i> S. Ho-Woo <i>Superintendent, School Branch North</i>
	Ministry of Health	S.H. Lim <i>Head, Department of Emergency Medicine Singapore General Hospital</i> V. Anatharaman <i>Department of Emergency Medicine Singapore General Hospital</i> A. Ang <i>Consultant, Department of Emergency Medicine KK Women's and Children's Hospital</i>
Road Authority	Land Transport Authority	Y.D. Lew <i>Senior Manager, Policy</i> K.K. Chin, <i>Senior Manager, Transportation</i> S.J. Long <i>Manager, Vehicle Engineering Department</i> S.T. Ho <i>Assistant Manager, Road Safety Section, Traffic Management Department</i> A. Soong <i>Assistant Manager, Road System Section, Safety Department</i>
Police	Traffic Police	K.T. Teo <i>Commander Traffic Police</i> D. Tan <i>Head Research and Planning Department</i> R. Chong <i>OC, Road Safety</i> J. Koo <i>Planning Officer (Information), Research and Planning Branch</i>
Driver Training Centers	Bukit Batok Driving Centre	S. Ismail <i>Manager, Training</i>
	Comfort Driving Centre	S.K. Chew <i>Chief Training Instructor</i>
	Singapore Safety Driving Centre	T.B. Tan <i>Manager</i>

Professional/Trade Associations	Automobile Association of Singapore	Y.F. Ling <i>General Manager</i> C. Chan <i>Assistant Manager, Corporate Communications</i>
	Motorcycle Association	S.F. Kang <i>Second Organising Secretary, Storm Riders Motorcycling Club</i>
	Singapore Logistics Association	S.H. Ng <i>Executive Director</i>
	Chartered Institute of Logistics and Transport	H.C. Chin <i>Vice Chairman</i>
Public Transport Sector	Public Transport Council	C.K. Loh <i>Secretary</i>
	SBS Transit Limited	R. Zee, <i>Director Safety, Safety Department</i>
	Trans-Island Bus Services Limited	P.C. Tay <i>Senior Manager, Communications</i>
Emergency Services	Singapore Civil Defence Force	E.H. Tan <i>Chief Medical Officer</i>
Universities	National University of Singapore	H.C. Chin <i>Centre for Transportation Research</i>
	Nanyang Technological University	Y.D. Wong <i>Centre for Transportation Studies</i>
Private Sector	3M	G. Choo <i>Traffic Control Materials Division</i>
	Shell	P. Benjamin <i>Operations Manager</i>
Nongovernment Organization	National Safety Council of Singapore	M. Tan <i>President</i>
	General Insurance Association	G. Rajagopal <i>Deputy Motor Convenor</i>

Appendix 2 Reported Road Accidents and Other Statistics

Tables A2.1–A2.9 examine data related to reported road accidents in Singapore. Table A2.10 examines arrests related to driving while intoxicated.

Table A2.1: Road Accidents Resulting in Injury or Death
(2001 and 2002)

Accident Severity	2001	2002	Difference	
			No.	%
Fatal	186	190	4	2.2
Serious Injury	302	145	(157)	(52.0)
Slight Injury	6,603	6,544	(59)	(0.9)
Total	7,091	6,879	(212)	(3.0)

No. = number.

Source: Singapore data.

Table A2.2: Accident Rate Per 10,000 Vehicles
(2001 and 2002)

Accident Severity	2001	2002
Fatal	2.6	2.7
Serious Injury	4.3	2.1

Source: Singapore data.

Table A2.3: Road Accident Casualties
(2001 and 2002)

Casualty Type	2001	2002	Difference	
			No.	%
Fatality	194	199	5	2.6
Seriously Injured	340	172	(168)	(49.4)
Slightly Injured	8,963	8,900	(63)	(0.7)
Total	9,497	9,271	(226)	(2.4)

No. = number.

Source: Singapore data.

Table A2.4: Casualty Rate Per 100,000 People
(2001 and 2002)

Casualty Type	2001	2002
Fatality	4.7	4.8
Seriously Injured	8.2	4.1

Source: Singapore data.

Table A2.5: Fatalities by Road User Group
(2001 and 2002)

Road User Group	2001	2002	Difference	
			No.	%
Motorcyclists and Pillion Riders	88	101	13	14.8
Automobile Drivers and Passengers	25	21	(4)	(16.0)
Pedestrians	54	49	(5)	(9.3)
Pedal Cyclists	12	16	4	33.3

No. = number.

Source: Singapore data.

Table A2.6: People Injured in Road Accidents by Road User Group
(2001 and 2002)

Road User Group	2001	2002	Difference	
			No.	%
Motorcyclists and Pillion Riders	4,811	4,637	(174)	(3.60)
Motorcar Drivers and Passengers	2,233	2,232	(1)	(0.04)
Pedestrians	870	874	4	0.50
Pedal Cyclists	343	349	6	1.70
Others (including bus passengers and drivers and heavy and light goods vehicles drivers and passengers)	1,046	980	(66)	(6.3)
Others (including bus passengers and drivers and heavy and light goods vehicles drivers and passengers)	15	12	(3)	(20.0)

No. = number.

Source: Singapore data.

Table A2.7: Motorcyclists Involved in Fatal and Injury Accidents By Age Group

Age Group	2002	Rate
30 Years of Age and Below	2,505	339.3
31–50 Years of Age	1209	65.3
51 Years of Age and Above	456	55.7

Source: Singapore data.

Table A2.8: Motorcyclists Involved in Fatal Accidents by Age Group

Age Group	2002	Rate
30 Years of Age and Below	63	8.5
31–50 Years of Age	27	1.5
51 Years of Age and Above	17	0.9

Source: Singapore data.

Table A2.9: Motorcyclists Killed in Accidents by Age Group

Age Group	2002	Rate
30 Years of Age and Below	53	7.2
31–50 Years of Age	21	1.1
51 Years of Age and Above	16	2.0

Source: Singapore data.

**Table A2.10: People Arrested For Driving While Intoxicated
(2001 and 2002)**

Reported Cases	2001	2002	Difference	
			No.	%
Accident Cases	439	342	(97)	(22.1)
Nonaccident Cases	1,452	1,483	31	2.1
Total	1,891	1,825	(66)	(3.5)

No. = number.

Source: Traffic Police of Singapore data.

Appendix 3 Estimates of Underreporting

Introduction

In estimating the national cost of accidents, the traffic police database has been used. While it is certain that all fatal traffic accidents are captured in the traffic police database, there remains uncertainty as to how many injury accidents occur without being reported to the Traffic Police Department. To establish the degree of underreporting of injury accidents as well as possible misrecording in the data captured in the traffic police database, a study was undertaken to compare hospital records with the traffic police records.

It would be an extremely extensive exercise if all hospital records of traffic accident casualties were cross-checked with traffic police data. Further, given that there may also be recording errors in both databases, it would be difficult to ascertain the quality of data recording without establishing a satisfactory benchmark. To limit the problems involved, and because the study is a preliminary assessment of the quality of accident data, only a limited sample is used.

Sample Study

The study involves cases reported to KK Women's and Children's Hospital, which handles most cases involving children. The period of investigation was from January 2002 to July 2002, and the study involved children under 17 years of age. All cases of road traffic accidents were tracked, with details carefully recorded. These cases were matched with records in the traffic police database. Where records matched, a further check was undertaken to find out how many entry errors were made. For this preliminary study, four fields were examined: the date of the

accident and the gender, age, and race of the victim.

A total of 283 accident cases were admitted to KK Women's and Children's Hospital during the study period. During this period, traffic police recorded 287 cases of children injured in traffic accidents. Of these, 80 cases were matched. Among those matched, there were discrepancies in the data entries. Of the 80 cases, 12 had age differences. Another 11 cases had different dates. There were two cases with different records of race and another two with different genders.

Differences in the value of ages recorded arise partly because the hospital uses a resolution of 0.1 year while the traffic police use a resolution of 1 year. Of the 12 cases of age differences, eight cases can be attributed to possible misreading of the age, since the two recorded values do not differ by more than 2 years. The other four records are clearly miscoding errors.

It is more difficult to account for the differences in the recorded date of injury, largely because there is no clear pattern. This may simply mean that these are mistakes made when entering the data. In some cases, the error is obvious (e.g., 01 becomes 02 or the date field is confused with the month field). In most cases, the difference is not easily distinguishable, and this may be due to poor handwriting or misreading the date.

Apparently there is greater accuracy in entering the gender and race fields. This may be because these are single-key entries with a limited number of options.

What is more interesting are the mismatched cases, since there are 203 among 283 cases. This high proportion of

mismatches may be largely due to the difference in definitions adopted by the two institutions. Traffic police consider road traffic accidents as those where vehicles on the road are involved. Cases captured in the traffic police database are those reported by drivers where at least one vehicle was involved. For hospital cases, road traffic accidents are defined by the locality of the accidents. If accidents occur on or near roads, regardless of the involvement of vehicles, they are considered road traffic accidents.

Reports to the hospital are made for the injured parties who, in this study, are not drivers. This difference accounts for 129 of the mismatches. Since any accident in the vicinity of a road may be considered a road traffic accident, there will be numerous cases where no road vehicles are involved. Obvious cases include a child being hurt walking into a lamppost or a child falling into a drain. In many instances, the accident may not even be near a road, although some form of vehicles is involved. For example a child falling from bicycle or a child falling while skateboarding would be recorded by hospitals as road traffic accident injuries.

The remaining 74 cases clearly involve road vehicles and may be classified as road accidents. These may represent cases where no traffic police reports are filed. They fall into two categories: pedestrian and passengers, with the latter covering private cars, public service vehicles, and goods vehicles. Most of these involve only very minor injuries.

There were 23 cases of pedestrian accidents, usually while a child was crossing or walking along a road. Of these, 10 involve collisions with cars and four with taxis.

In some cases, injuries were sustained when children took evasive action to avoid contact with vehicles.

Among the 51 cases of those injured while traveling in a vehicle, 28 cases were

passengers in private cars, 10 in buses, and 6 in taxis. Many cases do not involve collisions but conflicts in the road environment. For example, a child sustained an injury after hitting some part of a vehicle when the driver braked suddenly.

Conclusion

In conclusion, based on the limited survey of accidents involving children, about 46% of the cases in which a victim sought medical treatment were not the usual traffic accident cases of interest, because there was no collision between vehicles. Adopting a stricter definition of road traffic accidents, in which injuries are sustained because of conflicts in the road environment, 48% of these accidents were not reported to the police. However, as these did not involve collisions between vehicles, the injuries sustained were minor. It is therefore most likely that drivers did not see the need to make the usual traffic police report. They would have already made an accident police report at the hospital.

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