The State of Road Safety in the Philippines

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The seemingly rosy picture depicted by our accident statistics cannot cover up the failure of our transportation system. The paper explains how a major flaw in the definition of fatality can distort our accident data to persuade us that the state of road safety in the country is satisfactory. The major causes of accidents related to the road, the driver and the vehicle are identified. While safe vehicles and good roads are vitally important for safety, the key element in accident prevention is still the driver him/herself. A vehicle or highway defect may also play a part, but the principal cause is generally human failure. Recommendations are presented to improve traffic safety on the road.

1. INTRODUCTION

An adverse effect of motorization is the increasing rate of occurrence of traffic accidents. Every year, worldwide, at least 500,000 people are killed on the road; 70 percent occur in those countries which the World Bank classifies as low or middle income[1]. While the road accident situation is improving in high-income countries, most developing countries face a worsening situation. All countries experience the same transportation and traffic problems related to mobility, environment, safety, public transportation and energy, although it is the developing countries that suffer

the most. In particular, it is in the developing countries where accident rates remain unchecked. It is in these countries where priority on safety is clouded by other priorities focusing on infrastructure development for improved mobility and in addressing the need for a better public transportation system.

2. Traffic Safety

The state of road safety of a country or a region is normally measured by the frequency of occurrence of accidents. Key indicators are number of accidents (fatal, injured or property damage) and accident rates. Table 1 shows the distribution of accidents in the country[2]. Most accidents (72.44%) occurred in the National Capital Region (NCR) or Metro Manila. Metro Manila still has the highest rates in terms of rates per population followed by Region 10 (Northern Mindanao). However, in terms of rates per registered vehicle, Region 10 ranks highest, followed by Metro Manila.

TABLE 1. Distribution of Accidents by Region

Region	No. of Accidents (1999)	%	Population ('000) As of May 2000	Accident per 100,000 Population	Vehicle Registration (1999)	Accidents per 10,000 Veh. Registration
NCR	10,595	72.44	10,492	100.98	1,271,227	83.34
CAR	299	2.04	1,352	22.12	45,004	66.44
1 Ilocos Region	27	0.18	4,174	0.65	177,129	1.52
2 Cagayan Valley	55	0.38	2,756	2.00	112,660	4.88
3 Central Luzon	328	2.24	7,797	4.21	415,090	7.90
4 Southern Tagalog	91	0.62	11,321	0.80	458,621	1.98
5 Bicol Region	672	4.59	4,629	14.52	92,315	72.79
6 Western Visayas	101	0.69	6,147	1.64	190,461	5.30
7 Central Visayas	267	1.83	5,404	4.94	277,509	9.62
8 Eastern Visayas	252	1.72	3,589	7.02	65,305	38.59
9 Western Mindanao	429	2.93	3,045	14.09	83,783	51.20
10 Northern Mindanao	690	4.72	2,276	30.32	79,206	87.11
11 Southern Mindanao	118	0.81	2,601	4.54	170,132	6.94
12 Central Mindanao	433	2.96	2,494	17.36	61,466	70.45
13 ARMM	268	1.83	2,076	12.91	33,824	79.23
Total	**14,625**	**27.56**	**70,153**	**20.85**	**3,533,732**	**41.39**

Sources: Number of Accidents – Traffic Management Group (TMG), Philippine National Police
Population and Vehicle Registration – 2000 Philippine Statistical Yearbook

A commonly used rate to compare accident statistics is 'traffic safety'[3]. As defined by Trinca[4], it is a measure of how the road system is performing, given in terms of deaths per unit of travel, per registered vehicle or per unit of length of the road system. These rates are employed since summaries and totals do not develop the relative degree of hazard for different sets of conditions on a common basis.

Based on available data on fatalities and number of registered vehicles, traffic safety can be computed using the formula below[5]:

$$Traffic\_Safety = \frac{F \text{ x } 10{,}000}{V}$$

where: F = no. of fatalities within a year
V= no. of vehicles registered for the same year.

Figure 1 shows comparative statistics for road traffic accidents in selected countries.[6] For comparison purposes, a higher traffic safety value, i.e., higher fatality rate, corresponds to a lower level of safety. Most developed countries have been successful in reducing accident rates although the rates remain unchecked in many developing countries. Relative to other countries, our accident rate of about 6.0 fatalities per 10,000 vehicles appears to show better road safety conditions in the country. However, the author thinks otherwise, considering the high incidence of severe accidents reported in the newspapers. Are all such accidents accounted for? Do we have a good system for recording accidents? Why are we compiling accident records? How are the data kept? Are these data readily available to the traffic engineers and planners who are responsible for analysis and for improving our transportation infrastructure? The answers to these questions will reflect the priority we give to road safety.

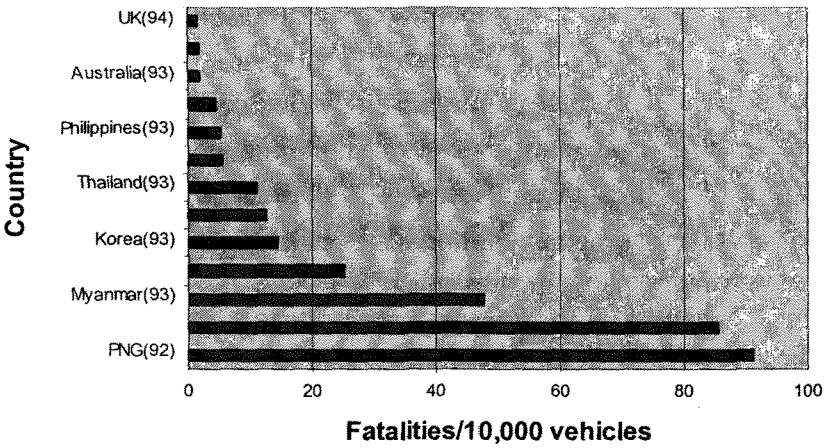

FIGURE 1. Traffic safety of selected countries

Further comparisons of recent statistics from some countries within the ASEAN region also imply that our situation is better than theirs (Figure 2). But are we really better off? Again, our perception of road safety, coupled with what we actually see on the road, and what the statistics tell us seem to differ.

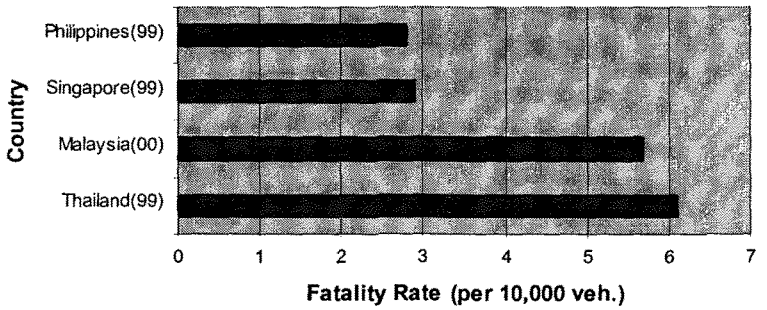

FIGURE 2. Traffic safety of selected ASEAN countries[7]

Table 2 shows the history of traffic safety for the years 1996 to 1999. Additional information on traffic safety in 1980 was obtained from Trinca. It is difficult to believe that traffic safety would drop from 24.4 in 1980 to about 2.7 in 1999. Have we really improved our road safety conditions by as much as 10 times? It is true that we have better running cars and probably better roads nowadays, but have

we become better drivers? Our very weak driver licensing control makes it difficult to weed out undesirables on the road.

Because our present awareness level of road safety is very low, it is hard to believe that our traffic accident situation has improved significantly over the years. This can be gauged by the attention we give to safety — hazards at road construction sites proliferate; open manholes are a common sight; dangerous locations or obstructions are not properly lit at night; pedestrians use the carriageway because there are no provisions for sidewalks (or the sidewalks are occupied by vendors), etc.

TABLE 2. Traffic Safety for the Philippines[8]

Year	Fatalities	Vehicle Registration	Traffic Safety
1980	-	-	24.40
1996	645	2,904,487	2.22
1997	2,049	3,193,549	6.42
1998	1,213	3,316,817	3.66
1999	969	3,533,732	2.74

The previous discussion clearly shows a major flaw in comparing statistics on fatalities. The standard definition of a traffic death recommended by the United Nations Organization, Geneva is one that occurs within 30 days of the event[9]; the Philippines defines 'fatality' as 'death at the scene'. Other countries use still different definitions such as death within 6 or 7 days, or even death within 12 months. (Table 3 shows a sampler on how fatality is defined by some countries.) However, most of these countries adjust their statistics by applying correction factors to conform to the standard definition. Our current system of accident data keeping makes this practice of applying corrections almost impossible to do.

TABLE 3. Definition of Fatality by Selected Countries

Country (within given time)	Fatality Definition
Spain, Portugal, Turkey, Japan	24 hours
Hungary	48 hours
France, Austria, Greece, Korea	3 days
Italy	7 days
Most OECD countries, Singapore	30 days
Switzerland (before 1992)	>30 days

Source of Data: IRTAD Special Report, 1998.

The same situation may be expected for accident statistics on injuries. Figure 3 shows the injury rate per 10,000 vehicles. Again, the Philippines would seem to be better off compared to some of our ASEAN neighbors. While it may also be true for other countries, minor injuries are oftentimes not recorded in the Philippines. The case is either settled amicably or the injured may not even bother to report the incident. This is particularly true for self-accident cases[10].

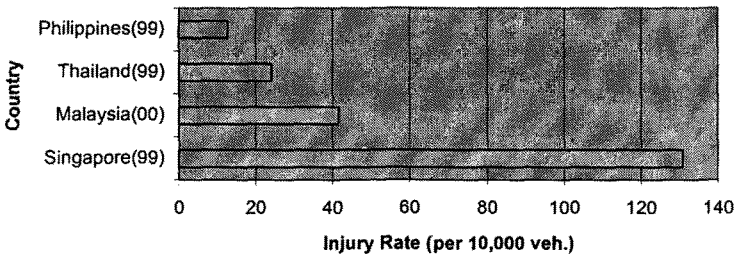

Figure 3. Injury Rates of Selected Countries[11]

One major cause of underestimating traffic accident statistics in the Philippines is the lack of an effective means of updating fatality and injury data. At present, we do not yet have a system in which records from hospitals are transferred to the Traffic Management Group (TMG) which is the proper authority responsible for data keeping. For accurate information on accidents, data from all hospitals have to be considered. Otherwise, deaths on later dates caused by traffic accidents cannot be accounted for.

3. Traffic Accident Causal Factors

An initial compilation of accidents that occurred in Metro Manila implicated 3 major factors in these traffic events, namely: the vehicle, the road and the driver. (See Figure 4)

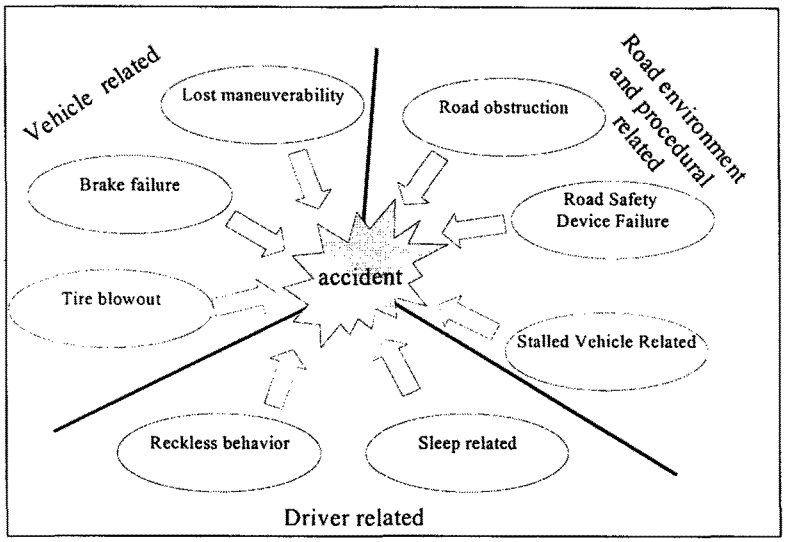

Figure 4. Accident Causal Factors[12]

This sampler of the most recent accidents indicates that vehicle-related issues are more significant than previously imagined. The present usage of many road-unworthy vehicles is obvious from the sampler – brake failure, tire blowout, and losing maneuverability. The condition of the road is also identified as a major cause of accidents. Road obstructions such as protruding elements in driving lanes and stalled vehicles are also significant contributors to traffic accidents.

While safe vehicles and good roads are vitally important for safety, the key element in accident prevention is still the driver him/herself. Safety experts tell us that driver errors contribute to about 85% of all accidents[13]. While a vehicle or highway defect may also play a part in some of these accidents, the principal cause is generally human failure.

An indication of the poor attitude of our drivers is discourtesy in traffic which can be observed daily on the road – using opposite lanes to be the first in queue at intersections, crowding other motorists out of line, blowing the horn in irritation, making pedestrians jump for their lives or scaring one's passengers by overspeeding. Recklessness of drivers is quite rampant. This may be due to willful disrespect of traffic rules rather than ignorance of the same. As far as value systems are concerned, this attitude may stem either from lack of patience or lack of respect for the rights of others.

4. The Road Environment

Accidents at intersections

Intersections or junctions are normally the points of conflict in our transportation system. The latest available data[14] show that about one-third of accidents occurred at intersections (Figure 5). This is generally true of other countries as well. However, local studies on the occurrence of accidents at intersections are scarce, with hardly any reference to the subject.

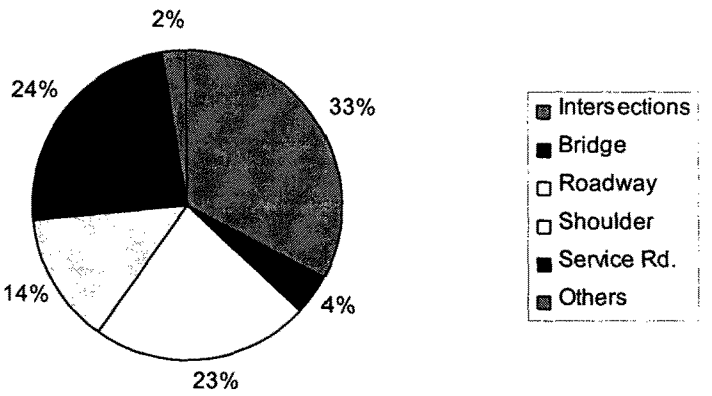

Figure 5. Distribution of accidents by location
(Source: TMG)

Table 4 shows the number of accidents involving fatalities in year 2000. Again, the share of intersections as site of accident is a significant 36%.

TABLE 4. Fatal Accidents by Location (2000). Source: TMG

Location	No. of Fatal Accidents	%
Intersections	698	35.78
Bridge	89	4.56
Roadway	432	22.14
Shoulder	308	15.79
Service Road	412	21.12
Others	12	0.62
Total	1951	100

Accident rates are normally used for the analysis of accidents at intersections. These rates are determined on the basis of exposure data such as traffic volume. A commonly used rate is the rate per million entering vehicles(RMEV) or the number of accidents per million vehicles entering the intersection[15]. This may be stated as:

$$RMEV = \frac{A \times 1{,}000{,}000}{V}$$

where: A = total number of accidents or number of accidents by type occurring 1 year at the location
V = average daily traffic (ADT) x 365

Normally, accident occurrence follows a trend shown in Figure 6. However, this assumes that only the exposure (in terms of traffic volume or total entering vehicles) changes.

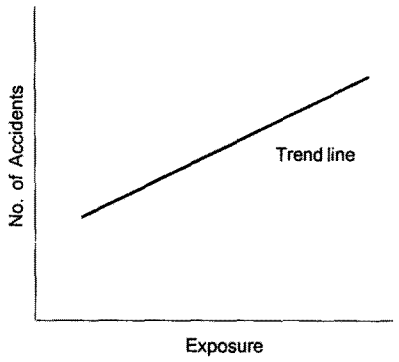

Figure 6. Typical relation between exposure and accidents

One of the more accident-prone intersections, Aurora Blvd. and Katipunan Ave. Intersection located in Quezon City, will be considered as a case study. The trend does not seem to apply for this intersection (Figure 7). The scatter plot looks sinusoidal in shape, showing that there is no linear relationship between the number of accidents and exposure in terms of average daily traffic (ADT).

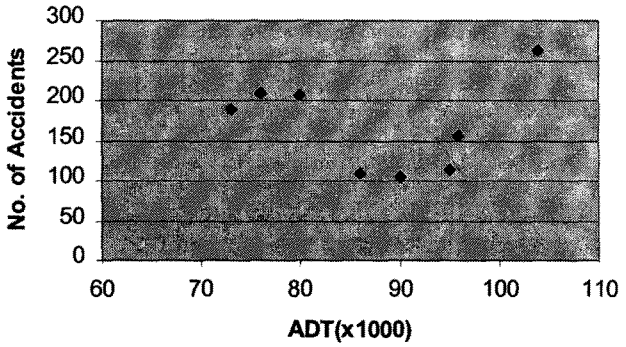

Figure 7. Accidents and Exposure for Aurora Blvd.-Katipunan Ave. Intersection[16]

Several changes were introduced at the intersection during the period (1990-1999). These are summarized in Table 5.

TABLE 5. Traffic Data for Aurora Blvd.-Katipunan Intersection[17]

Year	ADT	No. of Accidents	Acc. Rate/MEV	Comments
1990	89738	104	3.175	
1991	85915	109	3.476	start of flyover construction
1992	95159	114	3.282	
1994	96200	156	4.443	
1996	72724	190	7.158	*Alta Vista* side closed (under construction); intersection converted to T-intersection.
1997	103770	262	6.917	Flyover in full operation; at-grade converted to 4-leg.
1998	79867	206	7.067	
1999	76314	210	7.539	One leg converted to one way

[1] ADT (Average Daily Traffic) data were obtained from Traffic Engineering Center (TEC); Accident data were obtained from TMG.

In order to determine whether these changes may have caused the nonlinear relation between accidents and exposure, these changes were superimposed in Figure 8. The two lines shown on the graph represent accident and accident rates.

The actual number of accidents continued to increase from 1990 up to 1997 when the flyover was opened to traffic, after which there is an observed downtrend. In terms of accident rates, peaks were observed when the Alta Vista side was closed to traffic and when one of the legs of the intersection (UP side) was converted to one way. The closure of the Alta Vista side was necessary to complete the construction of the flyover. This closure converted the 4-leg intersection into a T-intersection. On the other hand, the conversion of a leg to one way was intended to improve traffic flow at the intersection due to the construction of LRT Line #2.

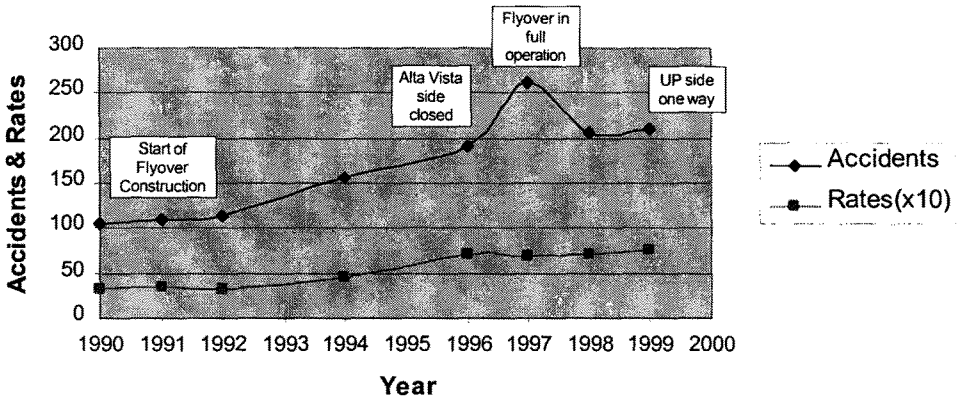

Figure 8. Accidents and Accident Rates at Aurora Blvd.-Katipunan Ave. Intersection

The study by J.C. Tanner[18] observed that a significant change in injury accidents occurred whenever an intersection changed from one form of control to another. This observation generally held true for the Aurora Blvd.-Katipunan Intersection.

Accidents by Time of Day

An alarming aspect of traffic accidents is that most of these occur during nighttime as shown in Figure 9. While other contributing factors may exist, the major ones are a) inadequacy of street lighting, b) lack of warning devices, and c) complete disregard of traffic signals late at night or early in the morning.

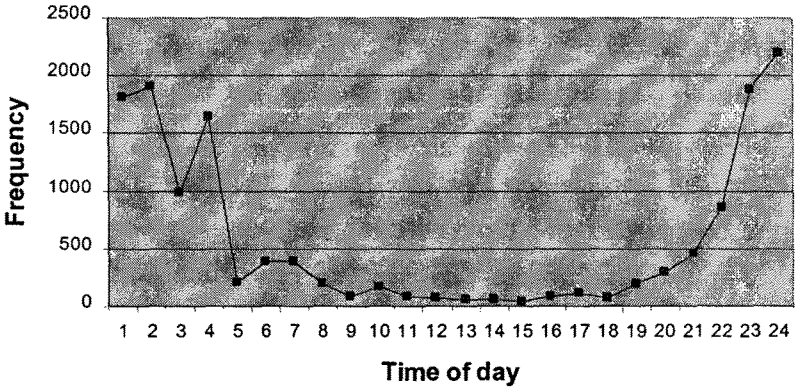

Figure 9. Distribution of accidents by time of day(Yr. 2000)
(Source of data: TMG)

5. Improving Road Safety

There is urgency in improving safety on our roads. The following plans and programs should be given priority in addressing the issue of safety:

1. Among the causal factors, there seems to be a general consensus that the majority of accidents can be attributed to driver's error. The government must implement stronger driver licensing control and driver improvement programs. This is the first step in weeding out undesirables on the road. Our licensing system is so lax that one does not have to learn how to drive before getting a driver's license. Driver licensing requirements must be tied in with driver education.
2. There must be a continuing program to increase the level of awareness on road safety. The program must include expanded and proper use of all media. The range of available media and their effectiveness are listed below:
   - Television: has the widest coverage; makes it possible to address the audience directly.
   - Radio: good coverage.
   - The press:
     i. daily press: excellent coverage; makes it possible to disseminate information at local and regional levels.
     ii. specialized press: mainly comprised of motoring newspapers or magazines, including those published by the automobile clubs; has limited coverage, but message can reach a selected circle of readers, with particular interest in motoring.
     iii. periodicals: good coverage though often limited to certain social groups.
     iv. publications of consumer groups or house magazines: limited coverage; editorials enable certain specific target groups to be reached.
   - Posters: coverage depends on the number and siting of billpostings.
   - Cinema: makes it possible to use short films (in between main features, reviews and advertisements).

- Brochures, pamphlets, circulars: very easily distributed, given to drivers; detailed points can be made; certain target groups are very receptive but wastage is very high; makes it possible to use distribution points such as petrol stations, garages, government offices issuing number plates, etc., giving greater credibility to the message.
- Modern telecommunications, e.g. cellular phones, pagers, etc.
- Stickers: can be exploited in a wide variety of ways(inside or outside vehicles); gives wide coverage; the stickers may also be used in waiting rooms of selected intermediate groups such as doctors, thus increasing credibility.

3. Availability of reliable data on accidents is a key to understanding how the transportation system works. However, without a systematic method for accident data collection, processing and analysis, the overall picture of road safety in the Philippines remains obscure. The seemingly rosy picture depicted by our accident statistics cannot cover up the failure of our transportation system. There must be wholehearted commitment to improve traffic accident investigation, reporting and analysis. A computer database on traffic accidents must be developed. Initially, the database may focus on Metro Manila and later on expanded to include the whole country. A more complete reporting of traffic accidents and the better use of accident records will prove very useful in planning preventive activities. In particular, records from hospitals must be included to minimize, if not to eliminate, underreporting of accidents. It is therefore necessary to establish an integrated accident database incorporating police and hospital reports. This would be possible only if there is a very strong linkage between the police and the hospitals. This may be achieved by undertaking a memorandum of agreement between the Department of Interior and Local Government (DILG) and the Department of Health (DOH).
4. As to the road environment, it has been shown that changes in control or geometric improvements applied to intersections result in significant changes in accident occurrence and accident rates. Caution is therefore urged when conducting test runs or experiments without careful prior analysis. A trial

and error method of solving traffic problems, as is often done in our setting, can thus be avoided.

5. Many accidents also occur at nighttime. Efforts must be exerted to improve visibility at night. Placement of appropriate traffic control devices (warning devices) at hazardous locations such as road construction sites can help minimize accidents.
6. Other measures which could help promote better road safety are the following:
   a. Improved uniform warning traffic signs and marking devices on all roads; rules must be written in a concise, readable way and posted in prominent spots.
   b. Safer pedestrian habits both through education and control measures.
   c. Prohibition of street children, vendors and the like on the carriageway; clearing all sidewalks of vendors.
   d. Banning of dilapidated (road unworthy) vehicles on the road.

6. Research on Road Safety

Research in the area of traffic safety has not been given fuller attention here in the country. But several questions need to be answered to have a better traffic safety program - Where are the high accident locations? How many were killed and injured last year? Where? When ? How?

Some of the more urgent topics for research are as follows:

1. Real causes of motor vehicle accidents, as differentiated from circumstantial factors.
2. Driver behavior and accidents (speeding, inattention, ignoring traffic control devices, drunk driving, driving while on drugs, failure to 'buckle up', etc.).
3. Relation of specific road and vehicle design elements to highway safety.
4. Monotony and fatigue problems in expressway driving or in long distance driving.

5. Developing improved means of communication from the highway to the individual user and between drivers.
6. Estimation of cost of traffic accidents.

Notes

1 Lamm, et. al, 1999.

2 Sources of data are the following: Traffic Management Group (TMG) for accident data (1999); National Statistics Office (NSO) for regional population(2000) and vehicle registration (1999).

3 The term 'traffic safety' should not be confused with 'road safety', which is used here to describe the condition of safety on the road, normally gauged by the number of accidents that are attributed to road vehicles.

4 Trinca, G. et al., Reducing Traffic Injury: A Global Challenge, 1988.

5 Pline, J.L., ed., Traffic Engineering Handbook, p. 95.

6 Source of Data: Melhuish.

7 Source of data: The First GRSP(Global Road Safety Partnership) ASEAN Seminar, 2001, Tokyo.

8 Table constructed from following sources: Trinca, Land Transportation Office and Traffic Management Group (TMG).

9 IRTAD Special Report: Definitions and Data Availability, OECD-RTR Road Transport Research Programme, 1998.

10 Self-accident cases are those accidents which involve only the driver and/or the vehicle being driven, inflicting either self-injury or property damage.

11 Source of data: The First GRSP(Global Road Safety Partnership) ASEAN Seminar, 2001, Tokyo

12 based on NC Tiglao's initial compilation of traffic accidents reported in the newspapers in March and April 2001.

13 Pline, J.L., ed., Traffic Engineering Handbook, p. 94.

14 Traffic Management Group Report, 2000.

15 Garber and Hoel, p. 138.

16 Sources of data: Traffic volume from Traffic Engineering Center (TEC); Accidents from TMG

17 ADT (Average Daily Traffic) data were obtained from Traffic Engineering Center (TEC); Accident data were obtained from TMG.

18 Tanner, J.C, Accidents Before and After the Provision or Removal of Automatic Traffic Signals. RRL Note. No. 2887, 1956.

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