

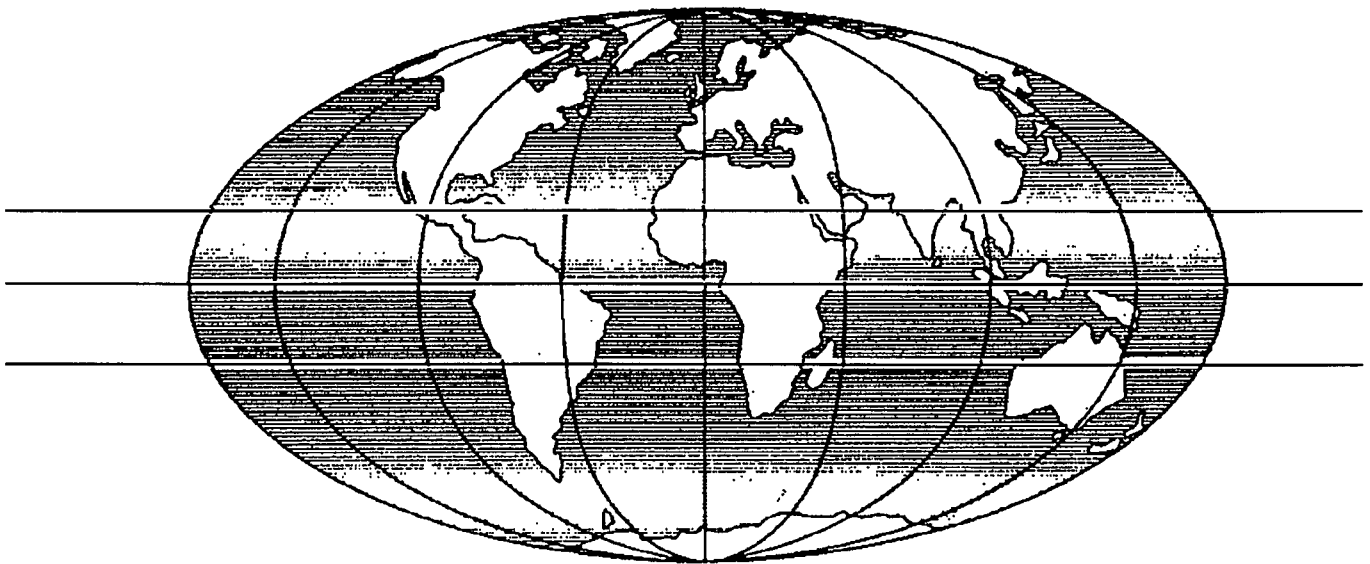


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# Reprint

**TITLE Pedestrians in developing countries:  
a vulnerable group**

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# PEDESTRIANS IN DEVELOPING COUNTRIES: A VULNERABLE GROUP

by

I A Sayer

## *Abstract*

*This paper describes some of the pedestrian safety research carried out by the Overseas Unit of the Transport and Road Research Laboratory UK, in collaboration with counterpart organisations in developing countries.*

*A study of casualty data indicated that pedestrians were a particularly vulnerable group, representing up to 70 per cent of the casualties in some developing countries. A more detailed analysis of the key patterns showed the high involvement of young people who, on average, were injured in twenty per cent of the accidents.*

*The pedestrian accident problem was investigated further by carrying out surveys of 'road-user behaviour and knowledge' in Jamaica, Pakistan Thailand and Egypt. Replies to road safety questions by children showed that their knowledge was often inadequate. The surveys also indicated that, in general, children were given much less advice than those in the UK. For example, relatively few were aware that crossing near parked cars was dangerous.*

*Drivers on the other hand, answered questions about giving way to pedestrians crossing roads correctly. Observations however, indicated that drivers rarely gave way, and not surprisingly, pedestrians were often unsure of their rights on crossings. Thus in Egypt, only two per cent of pedestrians interviewed thought that they sometimes had right of way when using a crossing.*

*To make pedestrians using roads safer, an integral approach to road safety is needed. It is suggested that driver behaviour at crossings can be improved by improving enforcement and by introducing new crossing designs. The inadequate amount of advice for pedestrians indicates that there is a need for more widespread and better safety education programmes.*

## **1. Introduction.**

Studies by the Overseas Unit of the Transport and Road Research Laboratory UK, (Jacobs and Sayer 1983; Jacobs and Sayer 1984; Sayer and Hitchcock 1984), have clearly shown that pedestrians in developing countries are a high risk group. Many industrialised nations have made strenuous efforts to improve pedestrian safety, with the result that low-cost engineering measures, road safety education, and enforcement programmes aimed at improving pedestrian safety, have become a key part of their accident prevention and reduction strategies.

In developing countries where resources are more scarce and traffic and accident problems relatively new, fewer actions have been taken to prevent and reduce road accidents. Also, because of the different conditions found in developing countries, there is some uncertainty about which actions should be taken. The different conditions found in developing countries suggest that the direct transfer of developed country solutions may not be successful or appropriate.

Therefore, in order to provide scientifically sound advice on effective remedial measures, it is necessary first of all to find out where and how accidents occur, and what are the contributory factors. Improvements can then be introduced on a trial basis and evaluated.

This is very much the approach adopted by the Overseas Unit's Road Safety Section, and this paper describes some of the Unit's cooperative research work into investigating the predominant pedestrian accident patterns and the levels of road-user behaviour and knowledge in developing countries. It concludes by giving some broad directions for improving pedestrian safety in the Third World.

## 2. Pedestrian accidents.

### 2.1 The magnitude of the problem.

From Table 1 it can be seen that the seriousness of the problem varies considerably from one country to another but in all countries, apart from those in South East Asia, at least one third of all the road accident fatalities were pedestrians. The figures for the cities, indicate that the problem is particularly grave in urban areas.

TABLE 1

Pedestrian deaths and injuries in developing countries.

Country	Pedestrian deaths	City	Pedestrians killed or injured
	Percentage of all fatalities		Percentage of all casualties
Ethiopia	84	Bangalor	35
Gyana	45	Bombay	70
Hong Kong	70	Delhi	47
Indonesia	20	Karachi	48
Jamaica	41	Mombasa	42
Jordan	47	Nairobi	43
Kenya	45	Surabaya	19
Kuwait	55		
Nigeria	35		
Sri Lanka	51		
Swaziland	55		
West Malaysia	22		
Zambia	40		
Zimbabwe	36		
Great Britain	33		

### 2.2 The nature of the problem.

A number of developing countries have improved their accident reporting and analysis systems by adopting modified versions of the Microcomputer Accident Analysis Package (MAAP) developed by the Overseas Unit initially, in collaboration with the Egyptian Authorities (Hills and Elliott 1986).

To find out more about the nature of the pedestrian accident problem, data from three countries, Egypt, Botswana and Pakistan, which are using MAAP, have been presented below.

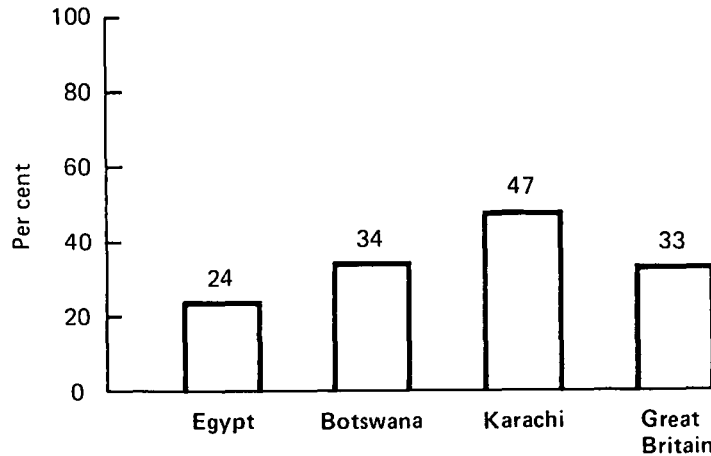


Fig.1 Percent of all fatal casualties that were pedestrians

It should be noted that the data for Pakistan are for the urban area of Karachi only, the data for Egypt are for the six main inter-city roads and three urban areas of Cairo, while the data for Botswana are national.

From Figure 1 it can be seen that of the regions studied, the greatest pedestrian fatality problem was in Karachi. Perhaps this is not surprising as the other data sets included accidents on rural roads where smaller proportions of pedestrian casualties would be expected. Thus in Botswana the corresponding figures for rural and urban roads were 11 and 45 per cent respectively.

Unexpectedly, in Egypt, the pedestrian problem appeared to worsen on rural roads. However, this unusual result was probably due to an anomaly in the classification system whereby all intercity roads were classed as rural even though many of their accidents would have occurred in towns and villages along the roads. Also, the urban data were restricted to just three areas of Cairo and not all the possible built-up areas of Egypt.

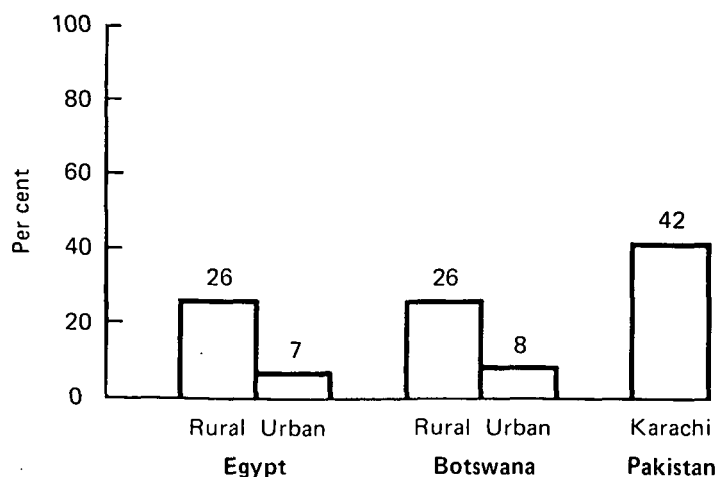


Fig.2 Percentage of fatal pedestrian casualties

In Botswana and Egypt, the pedestrian accidents were in general much more serious on the rural and inter-city roads than they were on the urban roads (see Figure 2). Again, this finding is not unexpected as vehicle speeds are usually much higher outside cities and towns and also emergency and medical services are often more remote. On the other hand, the Karachi result would appear to contradict this trend as the proportion of casualties who died was alarmingly high (42 per cent). However, this figure may not reflect the true state of affairs as it seems likely that many of the less serious accidents in Karachi may not have been reported to the police.

In all three countries, males were clearly much more likely to be injured as pedestrians than females and the males' share of the casualties ranged from 64 to 80 per cent. From Figure 3 it can be seen that at least one fifth of all pedestrians injured were under fifteen years of age and that the involvement of children in pedestrian accidents was particularly serious in Botswana. It is not clear why the Botswana figure is so high although it may simply reflect the age distribution of the population. An earlier study of children's road accidents (Downing and Sayer, 1982) indicated that most developing countries had a serious young pedestrian accident problem and on average one fifth of all the fatalities in the Third World countries sampled were children under fifteen compared with only ten per cent in developed countries. Consequently, it is clear that most developing countries should be giving some priority to making the roads safer for young pedestrians.

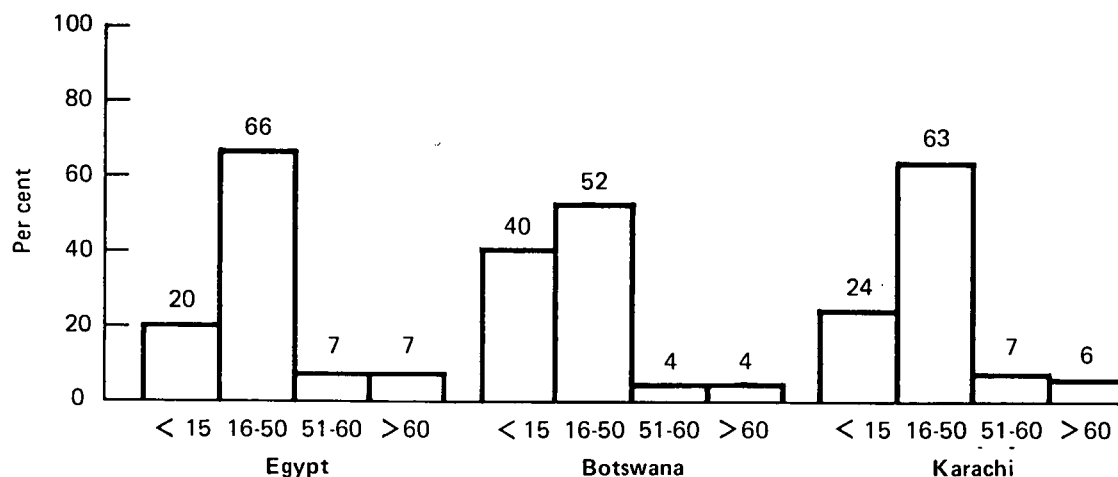


Fig.3 Age distribution of pedestrian casualties

From Figure 4 it can be seen that the distribution of pedestrian accidents throughout the day in urban areas was fairly similar for all three countries. Cairo experienced a slightly earlier peak, just before 16.00 hours, than Botswana where the peak was just after 16.00 hours. These differences were probably due to differences in the times when people finished work. One interesting and unusual feature of the Figure is the relatively high proportion of pedestrian casualties (7 per cent) that occurred in Cairo between 22.00 and 24.00 hours. Almost certainly, this feature is related to the high level of late night social activity in the city.

In all three countries, the majority of pedestrians were injured when crossing the road (see Figure 5). There was a slight tendency for Egypt to have the highest percentage of pedestrians injured when walking along the road which could reflect a greater degree of inadequate or obstructed footpath facilities but this is not certain particularly as the group of 'other' unknown actions

is much larger for the other two countries.

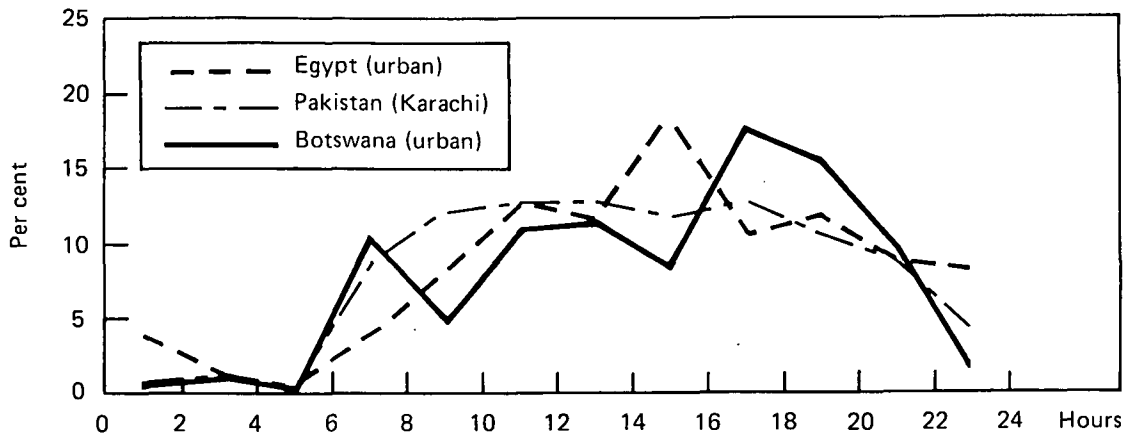


Fig.4 Urban pedestrian accidents by time of day

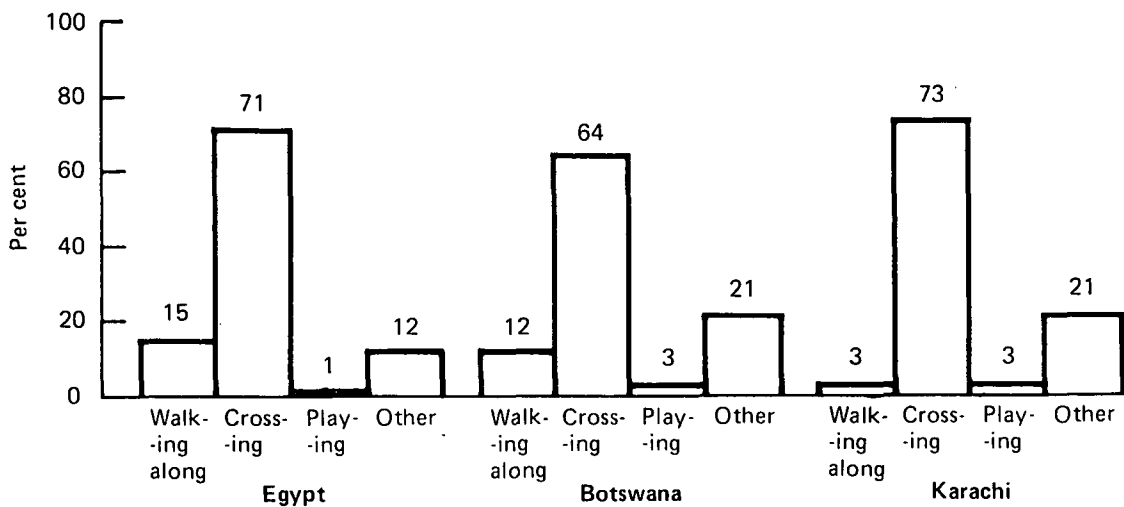


Fig.5 Pedestrian action at time of accident

From Figures 6 and 7 it can be seen that, in most accidents, the pedestrians were injured when there was no marked crossing nearby i.e. within fifty metres. Although this was the case in all three countries, there were some interesting differences between them and also within them. For example, in Figure 6, out of the three countries, Botswana had the highest proportion injured on crossings (11 to 17 per cent) and in Karachi 20 per cent more of the pedestrians aged over 14 were hit on or near crossings than the younger ones. Such findings need further investigation in order to determine the reasons which lie behind them. In Karachi it would be interesting to examine the data further to see whether young pedestrian accidents were more likely to happen in residential areas where there are probably fewer marked crossings.

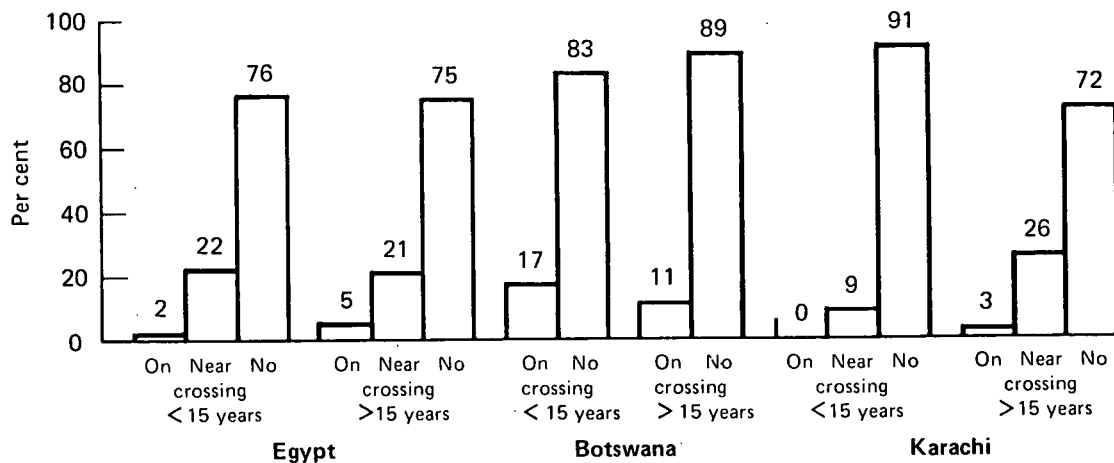


Fig.6 Pedestrian casualty: location by age

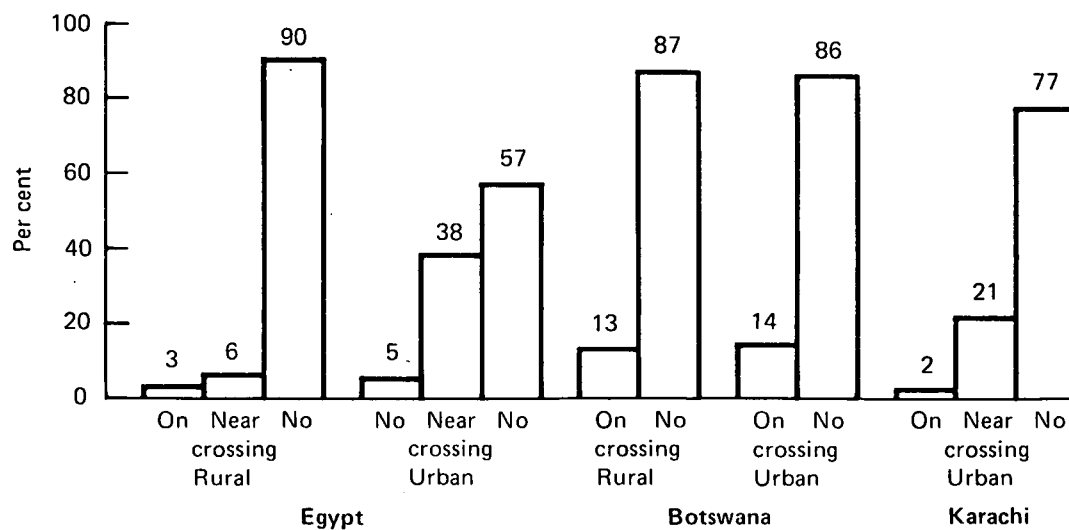


Fig.7 Pedestrian casualties: location by urban-rural areas

When comparing urban and rural pedestrian accidents (Figure 7) it was clear that far more had occurred at or near crossings in Cairo than on the intercity roads (43 per cent compared with 9 per cent) which is expected as there were very few marked crossings on the intercity roads. In Botswana police do not record whether or not accidents occur near a crossing, thus a similar breakdown of the data was not possible.

From Figure 8 it can be seen that junction accidents were a problem in all three countries with Botswana having the highest figure of 33 per cent in urban areas. As with crossings, pedestrians' problems at junctions may have been exacerbated by poor driver behaviour and also by inadequate traffic signal facilities for pedestrians. In Cairo drivers were allowed to turn right on the red signal leaving pedestrians without a completely safe crossing phase.



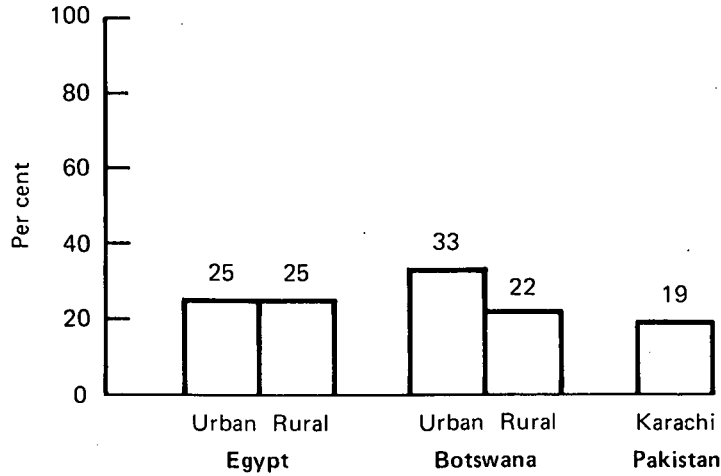


Fig.8 Percentage of pedestrians injured at junctions

The type of vehicle involved in pedestrian accidents varied from country to country and, to some extent, between urban and rural roads within countries (see Figure 9). These variations will generally have been due to differences between the traffic mixes. Thus there were relatively few commercial vehicles involved in urban pedestrian accidents particularly in Cairo where heavy good vehicles were banned in the day time.

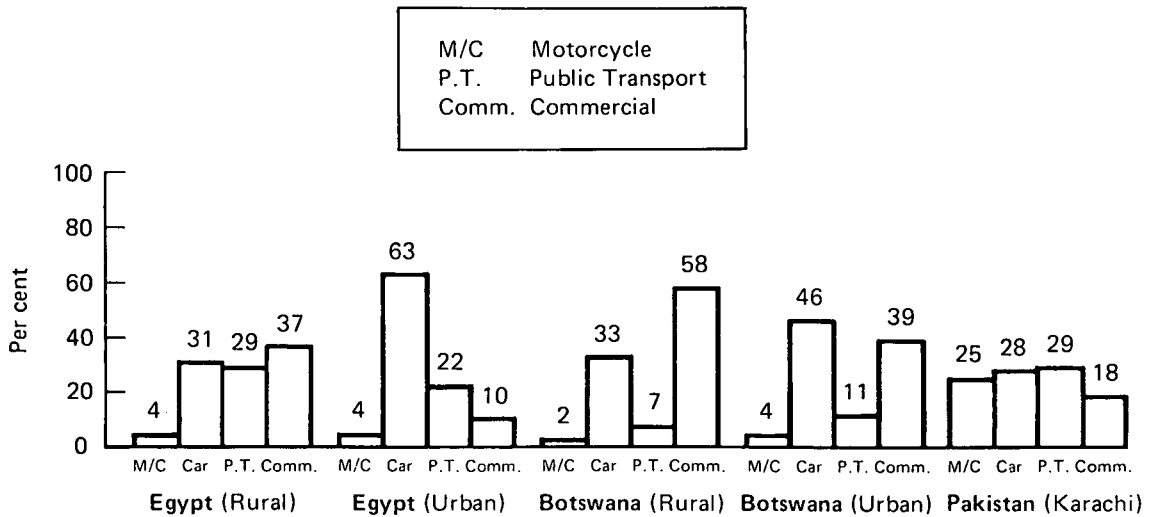


Fig.9 Pedestrian accidents: type of vehicle involved

In general the above results highlight some of the predominant pedestrian accident patterns; they will also have implications for the planning of road safety improvements. In addition they indicate a need for more detailed accident analysis and for additional research, such as studies of road-user behaviour and knowledge. This way, the road accident problems of pedestrians can be better understood. Results from some preliminary research into road-user behaviour and knowledge carried out by the Overseas Unit are given below.

### 3. Road-user behaviour and knowledge.

An examination of developing countries' police statistics on the causes of road accidents indicates that, in all countries, the police see road-user error as the main contributory factor. For example in Botswana, Ghana, Nigeria and Zimbabwe the lowest proportion of accidents attributed to road user error was 69 percent in Nigeria. Although police figures for causes have to be interpreted with some caution, they are likely to underestimate the part played by the road or the environment, the road-user factor is nevertheless clearly important. Accordingly, the Overseas Unit has carried out a number of surveys (Jacobs et al, 1981; Sayer and Downing, 1981; Downing and Sayer, 1982; Downing, 1985) of road-user behaviour and knowledge in developing countries and the findings which are relevant to pedestrian safety have been summarised below.

#### 3.1 Driver behaviour and knowledge.

It is usual for countries in their traffic legislation to give pedestrians on uncontrolled crossings such as Zebras the right of way over drivers. In practice however, the degree of drivers' compliance with this law varies considerably from country to country and from the results of observations carried out in a number of cities (Table 2) it can be seen that drivers' stopping behaviour in developing countries was poor when compared with the UK.

TABLE 2.

Stopping behaviour of drivers at zebra crossings.

City	Percentage of drivers choosing to stop for pedestrians
Bangkok	16
Colombo	11
Cairo	under 1
Kingston	10
Karachi	under 1
Nicosia	17
Surabaya	under 1
London	40
Reading	72

To determine whether drivers' reluctance to stop for pedestrians was due to inadequate knowledge, surveys were carried out in four countries in which drivers were selected at random and interviewed at the roadside. From the results presented in Table 3 it can be seen that, apart from Thailand, most of the drivers in the other three countries were aware that they were supposed to stop for pedestrians on crossings. In addition, in Egypt, 76 per cent of the drivers indicated that pedestrians had right of way on crossings and all of these findings suggest that the poor driver behaviour observed was usually due to the drivers attitudes towards pedestrians rather than to any gaps in their knowledge.

TABLE 3.

Drivers knowledge about pedestrian crossing rules.

Question	Answer	Percentage giving answer			
		Pakistan (Sample size 413)	Thailand (Sample size 251)	Jamaica (Sample size 496)	Egypt (Sample size 701)
A pedestrian steps onto a crossing as you approach.	Stop	94	57	78	100
	Slow down	3	33	20	0
	Go ahead	0	6	1	0
What should you do?	Don't know	2	4	1	0

### 3.2 Pedestrian behaviour and knowledge.

Clearly pedestrian accidents can be due to the pedestrians' own inadequate behaviour and knowledge rather than the drivers' poor behaviour. Observations and interviews carried out by the Overseas Unit in developing countries (Jacobs et al, 1981; Sayer and Downing, 1981; Downing and Sayer, 1982) indicated that pedestrian behaviour and knowledge was often not as good in those countries as it was in the UK.

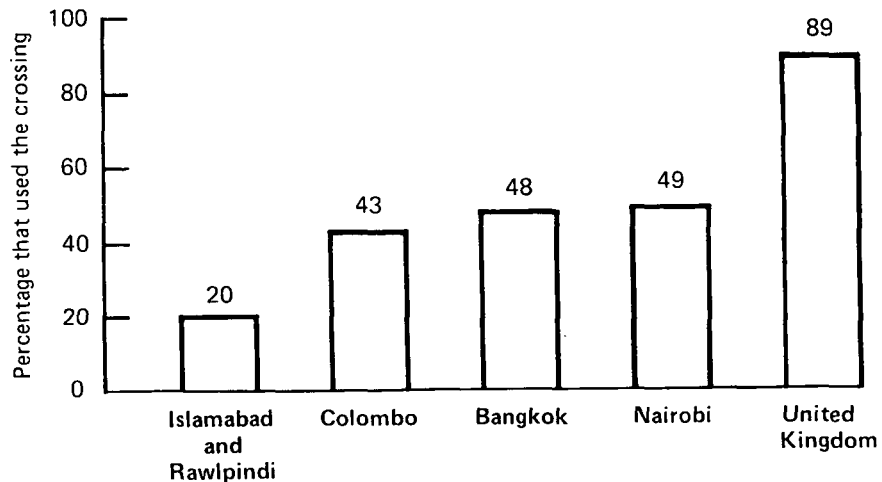


Fig.10 Pedestrians use of uncontrolled crossings or Zebra crossings

In the case of pedestrian crossings it is evident (see Figure 10) that pedestrians are less likely to use marked crossings in developing countries than they are in the UK.

As few drivers stop for pedestrians on crossings, it is perhaps not surprising that they are not used much. Indeed pedestrians may not see them as being more convenient or safer places to cross than anywhere else on the road. Thus in Egypt for example, only two per cent of pedestrians interviewed thought that there were any places where they had right of way over drivers. Similarly when they were asked about crossing rules or recommendations, only about seven per cent mentioned 'use a crossing' (see Table 4). In Pakistan however, 87 percent said 'use a crossing', although in practice the majority of pedestrians opted not to use them.

TABLE 4.

Pedestrians' road crossing knowledge.

Crossing rules/precautions	Per cent of pedestrians mentioning rule/precaution	
	Egypt (Sample = 695)	Pakistan (Sample = 360)
Use a crossing	7	83
Find a safe place	54	43
Look both ways before crossing	77	60
Stop before crossing	51	39
Cross when clear	17	21
Look while crossing	4	27
Listen for traffic	1	17

In other areas of knowledge about crossing roads, Egypt and Pakistan were fairly similar and in both countries the precautions 'looking while crossing' and 'listening for traffic' were rarely mentioned.

In Pakistan pedestrians were observed walking along roads and the results indicated that there was a need to improve this area of behaviour as well as road crossing behaviour. For example, at twelve sites with footpaths 26 per cent of pedestrians walked in the road and of these, 56 per cent walked with their backs to the passing traffic.

In the case of footpaths it is likely that their poor condition or possibly their high curb height could have dissuaded pedestrians from using them, but in the case of walking with their backs to the traffic it seems probable that many pedestrians did not know what to do. Thus when interviewed, only 58 per cent said they should walk facing the traffic. Similarly when they were asked what precautions they should take at night only 56 per cent referred to facing the traffic and hardly anyone (7 per cent) mentioned wearing bright clothing.

Overall, the interview results clearly demonstrated a need for improvements in pedestrian education and this finding is supported by the Overseas Unit's study of the crossing behaviour of young children in Jamaica, Pakistan and Thailand (Downing and Sayer, 1982). In this study, primary school children were given a crossing test on a simulated road marked out in the school play area and, in addition, they were interviewed and asked questions about using roads. In Table 5 the results of these tests and interviews for children aged 8 to 11 years have been compared with those from a similar pilot study carried out in the UK.

TABLE 5.

School childrens' performance on crossing tests and knowledge questions.

Country (Sample size)	Crossing Test Percentage of children who, before crossing:			Interview Percentage of children who mentioned:		
	Stopped	Looked	Looked to the side	Stop before crossing	Look before crossing	Look to side while crossing
Jamaica (287)	88	89	65	1	75	0
Pakistan (537)	92	76	68	61	38	21
Thailand (286)	91	74	46	11	42	0
United Kingdom (62)	98	95	70	56	71	62

On the whole the children in each country did reasonably well at the crossing test and they generally performed much better than might have been expected from their answers in the interviews. The differences between the test and the interview performances highlight the problem of assessing childrens' knowledge and ability and suggest that the results from interviews have to be treated with some caution.

The weakest area of behaviour for all the children was 'looking to the side while crossing' and in the three developing countries this was also the precaution least often mentioned by the children in the interviews. There was a tendency for the children in the small UK pilot study to do better than the other children particularly in the interviews. The developing country children were also less knowledgeable about safe and dangerous places to cross, for example less than three per cent of them mentioned 'by parked cars' as dangerous places to cross.

There was some evidence from the studies to suggest that these differences in knowledge between the UK and developing countries were due to differences in the road safety training given. For example, in Egypt over 75 per cent of the

pedestrians interviewed claimed to have had no road safety instruction and in the school children study it was clear that children in the developing countries had received less advice than those in the UK (see Table 6).

TABLE 6

The people who had talked to children about crossing the road.

Percentage of 8 to 11 year olds in:	People who had talked to children						
	Mother	Father	Teacher	Police man	Police woman	Friend	Other
Jamaica	63	41	34	28	5	19	7
Pakistan	73	78	37	13	4	16	11
Thailand	53	54	48	7	0	1	1
United Kingdom	95	83	83	64	8	27	57

The results from these preliminary studies point to a need to improve road safety education for pedestrians in developing countries. However, more research is required to determine the appropriate content, the optimum amount and the method of instruction that should be used.

#### Discussion.

This paper has demonstrated the seriousness of the pedestrian accident problem in developing countries and indicated some of the problems of poor road-user behaviour and knowledge which could have contributed to these accidents.

To reduce and prevent these accidents a comprehensive and integrated programme of remedial measures is required and education, enforcement and engineering measures will all have a part to play. In order to plan such programmes effectively, it is important that countries have good road accident data bases and, in addition to the normal police reports, that they carry out some in-depth investigations of pedestrian accidents so that the key patterns and contributory factors can be determined. The Overseas Unit has already embarked on such investigations in collaboration with organisations in Zimbabwe and Pakistan.

The inadequate pedestrian behaviour and knowledge and the relative lack of road safety advice all indicate the need for more and better training of pedestrians, particularly the young in developing countries. With this need in mind the Overseas Unit is planning to develop a code of good practice for road safety education which will provide advice for developing countries on educating pedestrians both through schools systems and community education programmes.

The poor behaviour of drivers in relation to pedestrians indicates that changes are also required in driver training and traffic law enforcement particularly towards driver behaviour at pedestrian crossings.

In addition, in many countries it is necessary to improve the facilities for pedestrians and, if uncontrolled crossings are shown to be ineffective, then other approaches will have to be considered. Thus some countries are already experimenting with raised pedestrian crossings which force drivers to slow down and the Overseas Unit is assisting with the design and evaluation of these in Pakistan and Ghana.

Although this paper has shown the importance of the pedestrian accident problem, the diversity of conditions and road accident patterns that exists even between neighbouring countries should not be forgotten. Consequently it is important that each country carries out its own systematic and objective accident investigation and that there is a continuous scientific evaluation of road safety improvements.

#### **Acknowledgements.**

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