Pedestrian accidents and road safety education in selected developing countries

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ABSTRACT

This paper describes part of the pedestrian and Road Safety Education research carried out by the Transport Research Laboratory, UK in collaboration with counterpart organisation in developing countries.

Analysis of casualty data from selected developing countries showed that pedestrians were a particularly vulnerable road user group. In some countries they represented 70 per cent of casualties injured. On average, road users under the age of 15 years of age were injured in 20 per cent of reported road accidents.

Although young people throughout the world are a high risk group of road users, Road Safety Education was a mandatory subject in only about 50 per of Ministries of Education worldwide. Additional investigation in more than 1200 schools in three developing countries showed that little Road Safety Education was being carried out in the schools. A lack of resources and poor teacher knowledge of teaching road safety were perceived as main problems.

Questioned about road safety, children showed that their road safety knowledge was often inadequate and that their awareness of how to cross roads safely was poor.

In 1994, TRL began developing materials and approaches that would provide models of good practice for Road Safety Education in developing country primary schools. As a result, a resource book for teacher's, a Tutor's Pack, and Good Practice Guidelines have been prepared.

1. INTRODUCTION

Studies by TRL (Jacobs and Sayer, 1983; Jacobs and Sayer, 1984; Sayer and Hitchcock 1984; Downing 1991; Downing et al 1993), clearly show that pedestrians in developing countries are a group of high risk road users representing many of all reported road accident casualties. For example, in African countries more than 40 per cent of road accident fatalities were pedestrians. In middle eastern countries it was more than 50 per cent. By comparison, in Europe and the United States of America (USA) pedestrians represented about 20 per cent of road accident fatalities.
The higher involvement of pedestrians in developing countries may have been simply due to increased exposure, i.e., more people making walking trips than is the case for developed countries. However, some evidence is available (Jacobs and Sayer, 1984), showing that when pedestrian and vehicle flows were considered, pedestrians were at more risk in developing country cities than they were in UK cities.

Studies by Downing (1991 and 1993), showed that approximately 20 per cent of fatal road accidents in developing countries involved young people under the age of 15 years old. In the UK and the USA it was about 10 per cent. On average, children in Africa represented more than one quarter of road accident deaths.

Traditionally, engineering remedial measures have been to the fore in developing countries. However, research (Sayer and Downing 1981, 1982), shows that both driver and pedestrian road safety knowledge can be both poor and inadequate in these countries. This suggests that road user education have both the scope and the potential for use in accident and injury reduction programmes in Third World countries. However, different conditions between developing and developed countries discourage the direct transfer of developed country solutions.

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 between countries but apart from countries in South East Asia, at least one-third of the road accidents fatalities were pedestrians. The Table shows that the problem is particularly severe in city areas. For example, in Bombay, 70 per cent of road accident casualties killed were pedestrians.

### TABLE 1

<table>
<thead>
<tr>
<th>Pedestrians killed or injured as a per cent of all fatalities</th>
<th>Pedestrians killed or injured as a per cent of all casualties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>City</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>84</td>
</tr>
<tr>
<td>Guyana</td>
<td>45</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>70</td>
</tr>
<tr>
<td>Indonesia</td>
<td>20</td>
</tr>
<tr>
<td>Jamaica</td>
<td>41</td>
</tr>
<tr>
<td>Jordan</td>
<td>47</td>
</tr>
<tr>
<td>Kenya</td>
<td>45</td>
</tr>
<tr>
<td>Kuwait</td>
<td>55</td>
</tr>
<tr>
<td>Nigeria</td>
<td>35</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>51</td>
</tr>
<tr>
<td>Swaziland</td>
<td>53</td>
</tr>
<tr>
<td>W Malaysia</td>
<td>22</td>
</tr>
<tr>
<td>Zambia</td>
<td>40</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>36</td>
</tr>
<tr>
<td>Great Britain</td>
<td>33</td>
</tr>
</tbody>
</table>
2.2 The nature of the problem
Data from Egypt (the six main inter-city roads), Botswana and Pakistan (Karachi), have been used to illustrate the nature of the problem of road accidents in developing countries.

Karachi, where the data set was entirely urban, had the worst pedestrian fatality rate; 47 per cent of all recorded road accident fatalities were pedestrians. In Botswana, 34 per cent of fatalities were pedestrians, a figure similar to that for Great Britain, 33 per cent.

Rural accidents are a serious problem in many developing countries. Few drivers reduce speeds through villages or give way to pedestrians. Houses and facilities such as schools and shops are often found on opposite sides of the main road, creating many pedestrian crossing movements. In villages where street lighting is seldom found, crossing a busy road at night can be particularly dangerous. Poor pedestrian pavement facilities and houses built directly onto the road side potentially contribute to the pedestrian accident situation.

The data showed that at least 20 per cent of all pedestrians injured were less than 15 years of age and that the over-representation of child pedestrians in Botswana was particularly high (40 per cent). In Egypt and Botswana, about 20 per cent of pedestrian injured were less than 15 years old.

In all three countries (Egypt, Botswana and Pakistan), about 70 per cent, of pedestrians were injured when crossing a road. The percentage of people injured when walking along roads was higher in Egypt (15 per cent), and Botswana (12 per cent) than in Karachi (3 per cent). In Egypt the provision of pavement facilities may be less than in the other two countries.

The type of vehicle involved in pedestrian accidents varied from country to country. With different vehicle mixes, types and condition this result might be expected. During the day, commercial vehicles are banned from Cairo City. This may account for the relatively low percentage (10 per cent) of pedestrians being injured by this type of vehicle in the urban areas of Egypt. Motor cycles are not a popular form of transport in either Egypt or Botswana and few pedestrians (about 4 per cent) were injured by this type of vehicle in these two countries. In Pakistan motor cycles are an important form of transport forming a major part of the vehicle fleet. Twenty-five per cent of pedestrians injured in Karachi were injured by motor cycles.

3. ROAD USER BEHAVIOUR AND KNOWLEDGE

3.1 Adults
Research (Jacobs 1981; Sayer and Downing 1981, 1982; Downing 1985), showed that, when compared with drivers from the London and Reading in England, few drivers from selected developing countries were prepared to give way to pedestrians at uncontrolled zebra crossings (see Table2).

To discover whether drivers' reluctance to stop for pedestrians was due to inadequate knowledge, randomly selected drivers were stopped and interviewed at the roadside in Pakistan, Thailand, Jamaica and Egypt.
TABLE 2
Drivers' stopping behaviour at uncontrolled crossings

<table>
<thead>
<tr>
<th>City</th>
<th>Percentage of drivers choosing to stop for pedestrians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangkok</td>
<td>16</td>
</tr>
<tr>
<td>Colombo</td>
<td>11</td>
</tr>
<tr>
<td>Cairo</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Kingston</td>
<td>10</td>
</tr>
<tr>
<td>Karachi</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Nicosia</td>
<td>17</td>
</tr>
<tr>
<td>Surabaya</td>
<td>1</td>
</tr>
<tr>
<td>London</td>
<td>40</td>
</tr>
<tr>
<td>Reading</td>
<td>72</td>
</tr>
</tbody>
</table>

Table 3 shows that apart from Thailand (57 per cent), most drivers in the other three countries were aware that they were supposed to stop for pedestrians on crossings. These results suggest that poor driver behaviour at uncontrolled crossings was probably due to driver attitude rather than a lack of knowledge.

TABLE 3
Drivers' knowledge about uncontrolled crossing rules

<table>
<thead>
<tr>
<th>Question</th>
<th>Possible answer</th>
<th>Pakistan Sample size</th>
<th>Thailand Sample size</th>
<th>Jamaica Sample size</th>
<th>Egypt Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>A pedestrian steps onto a crossing.</td>
<td>Stop</td>
<td>94</td>
<td>57</td>
<td>78</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Slow down</td>
<td>3</td>
<td>33</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Go ahead</td>
<td>0</td>
<td>6</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>What should you do?</td>
<td>Don't know</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

As so few drivers stop for pedestrians on crossings, it is not surprising that their use was limited. Finding that pedestrians do not use crossings and crossing roads elsewhere was to be expected. Pedestrians believed that they had few rights of way over vehicular traffic. In Egypt only 2 per cent of pedestrians interviewed thought there were any places where they had right of way over traffic.

When asked about crossing roads, only 7 per cent of respondents in Egypt mentioned using a crossing (see Table 4). For the same question in Pakistan, 83 per cent of pedestrians mentioned using a crossing. In practice few did so.
Listening for traffic when crossing a road was rarely mentioned in either survey. 'Look when crossing' was mentioned by 27 per cent of respondents in Pakistan but by only 4 per cent in Egypt.

### TABLE 4

Pedestrians' road crossing knowledge

<table>
<thead>
<tr>
<th>Crossing rules/precautions</th>
<th>Egypt</th>
<th>Pakistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use a crossing</td>
<td>7</td>
<td>83</td>
</tr>
<tr>
<td>Find a safe place</td>
<td>54</td>
<td>43</td>
</tr>
<tr>
<td>Look both ways before crossing</td>
<td>77</td>
<td>60</td>
</tr>
<tr>
<td>Stop before crossing</td>
<td>51</td>
<td>39</td>
</tr>
<tr>
<td>Cross when clear</td>
<td>17</td>
<td>21</td>
</tr>
<tr>
<td>Look while crossing</td>
<td>4</td>
<td>27</td>
</tr>
<tr>
<td>Listen for traffic</td>
<td>1</td>
<td>17</td>
</tr>
</tbody>
</table>

4. DEVELOPING ROAD SAFETY EDUCATION MATERIALS

To improve conditions for pedestrians in developing countries, an integrated approach to road safety is required and Road Safety Education in schools is an essential part of such an approach.

In using child road safety education as an approach to reducing road accidents, considerations have to include its appropriateness for the age of the children, the method by which they are taught, how best to carry out the programme and how to monitor any effect it might have.

UK experience shows that using real streets with real traffic, seems to have the most potential for road safety training of young children. Young children in particular seem to benefit most from the behavioural approach to road safety. In principle the behavioural approach may be no different to learning other perceptual/motor skills such as skiing and cycling.

#### 4.1 Surveys: Ministries of education and schools

Replies from 28 developing and 22 developed country Ministries of Education showed that 77 per cent of developed country ministries included Road Safety education in their curriculums. In developing countries it was 64 per cent.

Road safety Education was a mandatory subject in 55 and 50 per cent of developed and developing countries respectively. In 72 per cent of Third World country Ministries, Road Safety Education was combined with Social Science. It was taught as a separate subject in 11 per cent of the developing countries replying. In developed countries Health Education (47 per cent), was the most frequently used co-subject. Twenty-nine per cent of developed countries taught Road Safety Education as a separate subject.

About 50 per cent of 1580 randomly selected schools in Botswana, Pakistan (Islamabad) and
Zimbabwe said that they taught Road Safety Education. In Islamabad (26 per cent) and Zimbabwe (34 per cent), traffic safety instruction was left to the discretion of individual teachers. Road safety demonstrations and practices were carried out in about 50 per cent of schools in Zimbabwe.

'Crossing roads safety', was taught in more than 75 per cent of schools in Botswana and Zimbabwe. In Pakistan schools attached more importance to teaching 'safe places to walk' (Karachi 43 per cent, Islamabad 48 per cent).

In all three countries, importance was attached to teaching 'where to play safely' and 'safe places to cross'. Except in Zimbabwe, few schools taught the 'dangers of parked cars'. Only 8 per cent of schools in Islamabad, taught 'road safety vocabulary'. Few schools in Pakistan taught 'seeing and being seen'. However, two-thirds of the schools in the sample from Botswana and Zimbabwe did teach this.

In Zimbabwe, 74 per cent of sample schools in urban areas taught 'safe places to cross', whereas less than 60 per cent of rural schools did. A similar result was found with the question, 'people who can help children to cross'. Forty-eight per cent of urban schools taught this. Only 30 per cent of the rural schools did so.

About 10 per cent of schools in Pakistan conducted demonstrations and held practices in a playground. Material help was generally sought as posters and films.

Outside specialists eg police, were used to teach road safety in 28 per cent of schools in Botswana.

Police visited about 5 per cent of the schools surveyed in Pakistan and 8 per cent in Zimbabwe and Botswana. In all three countries, the parents' participation in teaching road safety in schools was negligible.

4.2 Schools: Problems encountered and desired improvements

About 20 per cent of schools surveyed showed that 'insufficient time/overcrowded time table' to be a 'very serious' problem in the teaching of road safety. Other 'very serious' problems were 'lack of resources and finance' (28 per cent in Karachi, 61 per cent in Zimbabwe), and 'difficulty in obtaining traffic safety education materials' (26 per cent in Karachi, 63 per cent in Zimbabwe). 'Available materials were no good' was a serious problem in about 30 per cent of all school.

'Too many pupils' ie classroom overcrowding, was 'not a serious problem' in most schools. Also 'not a serious problem' in 80 to 90 per cent of schools, was a 'lack of teacher interest'. Staff with 'lack of traffic safety knowledge' was a 'very serious' problem in 48 per cent of schools surveyed in Botswana and about 20 per cent of schools in Pakistan and Zimbabwe.

Eighty-five per cent of schools in Botswana, 84 per cent in Zimbabwe and 60 per cent in Islamabad listed 'new teaching/learning aids, posters and films' as the main 'very useful' improvement. In Karachi, priority was given to 'new teachers' guides'.

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Two-thirds of the schools surveyed in Zimbabwe, rated 'increased provision of outside experts' as 'very useful'. Results also showed that 'very important' for schools in Zimbabwe was 'advice on planning courses/syllabus' (51 per cent).

'Teacher courses at school' was 'very important' for 74 per cent of schools in Botswana, 57 per cent of schools in schools from Islamabad and 62 per cent of the schools from Zimbabwe. Except the schools in Karachi (27 per cent), courses for teachers, whether on or off school premises, were judged 'very useful' by schools in Zimbabwe (60 per cent) and Botswana (74 per cent). About 30 and 50 per cent of schools in Karachi and Islamabad respectively, rated courses for teachers as 'very useful'.

4.3 'Safe Ways': A Road Safety Education resource for teachers

4.3.1 School selection
TRL's programme of researching and developing Road Safety Education materials for developing countries began in Ghana, 1994. To ensure that a wide range of school types was included in the study, the 16 schools initially visited were part random and part preselected. Of the 17 schools, one was an all-girls' school, four were private and the remaining 12 were public schools. Most schools were single story buildings with corrugated iron roofs and shuttered windows without glass, which swung out to let in the light. Catchment areas tend to be wide and for the best private school, pupils could live 12 or miles away.

4.3.2 'Pilot' study
Of the 17 schools visited, five were selected to take part in a pilot trial in which the children's road safety knowledge questionnaire was tested and child interview techniques developed and assessed. About 35 children randomly selected from P5 (10 -11 years old), classes were interviewed on a one-to-one basis by TRL staff. As a result, the children pilot questionnaire was revised and improved in preparation for the 'before' and 'after' research work. TRL questionnaire protocols covered road safety knowledge, vocabulary and attitude.

4.3.3 'Before' and 'after' studies and teachers' workshops
Using schools from the 12 schools that had not taken part in the pilot study, a matched sample of six experimental and six control schools were selected to take part in the 'before' and 'after' studies. Schools were matched for class size, location and pupil male-female ratios.

Totals of 20 randomly selected pupils from the P5 age group classes were interviewed in the 'before' trials. So that the children could be identified for the 'after tests', each child's name, age and sex was recorded at the start of the interview.

The questionnaire took about 15 minutes to complete and contained:

- introductory general questions, designed to put children at ease, familiarise them with both the situation and accents, and ensure that the children understood that the test was not an exam
- questions on dangerous behaviour
- questions crossing behaviour
- questions on safe behaviour.
Twelve teachers from the six schools teaching the 'Safe Ways' materials attended the training workshops, held on four consecutive days. Each workshop lasted about three hours.

The aims of the teachers' workshops were to:

- give teachers' the necessary information needed to teach road safety in their schools, raise their awareness of road safety issues and stress the importance of teaching road safety to children
- describe what topics to teach, how it might be taught and persuade the teachers important of using the materials with their pupils
- study the 'Safe Ways' teaching materials in detail and participate in some practical exercises intended for P5 children.

4.3.4 Children's questionnaire results

Of the five 'dangerous behaviour' questions, three questions showed, at the 5 per cent level, a statistically significant improvement for the experimental group of children but not for the control group. One question showed a significant improvement for both groups. For the remaining question, there was no significant change for either group.

Of the five questions related to 'knowledge of crossing behaviour', four showed a statistically significant improvement for the experimental group but not for the control group. There was no statistically significant change in the answers for the remaining question. Of the five named safe crossing places, four showed a significant improvement for the experimental group. The question related to traffic lights improved significantly for both the control and experimental groups.

'Knowledge of safe crossing behaviour', Of the five questions, three showed a statistically significant improvement for the experimental group, one question improved significantly for both groups. The remaining question showed a significant improvement for the control group only.

4.3.5 The 'Safe Ways' resource

Following the school and teacher survey, 'Safe Ways', a resource for teachers, a 'Tutors Guide', and 'Guidelines of Good Practice' were prepared. The 'Safe Ways' resource aims to make 10 - 11 year old children safer pedestrians. It gives them exciting opportunities to learn in the classroom, school compound and in practical situations outside near real roads. Children can learn near and on their journeys to and from school.

The 'Safe Ways' resource is structured into five lessons that are best presented once a week in periods of about one hour each. It can be used as a standalone road safety project or as part of other curriculum subjects eg Mathematics, Science, Environment and English. It also fits in well with Life Skills subjects.
Key learning points are:

- walking safely
- crossing safely
- identifying safe routes to and from school.

4.4 The tutor's pack
The Tutor's Pack is a step by step guide to running Road Safety Education workshops for primary school teachers to be used with the 'safe ways' resource. Key to its development were the Road Safety Education workshops carried out during a two year period in Ghana.

The Pack is designed to provide teachers, who may have almost no experience of teaching road safety to primary school children, with all they need to use successfully the 'Safe Ways' resource. The Pack's assumption is that the person using it has teaching /lecturing experience, preferably in health, education or social studies. Beneficial but not essential, is a background in running workshops.

4.5 'Good Practice Guidelines'
The Guidelines illustrate the importance of Road Safety Education and show how a developing country might put in place a system that ensures primary school children receive adequate Road Safety Education.

The Guidelines are intended for policy makers in Ministries of Education, Transport, Health Pubic Works and the police. Curriculum advisors in the education services will also find the Guidelines useful. They could also be distributed to lectures in colleges of education, head and classroom teachers.

5. SUMMARY AND CONCLUSION
This paper describes some of TRL's planned research into understanding pedestrian road accidents and the development of materials and approaches for a model of good practice for teaching Road Safety Education in developing country primary schools.

That pedestrians are a vulnerable road user group is manifest by data from selected middle eastern countries showing that more than 30 per cent of reported road accidents were pedestrians. In Africa, the average percentage was more than 40 per cent. In many of these developing countries, children are an unprotected, vulnerable group and one of the most serious threats to their health and well being road traffic accidents.

Notwithstanding the pain, grief and suffering that children's pedestrian accidents bring to their families and parents, the collective annual cost to a country of hospital treatment, police and court administration etc. is considerable. In countries where children make a substantial contribution to the family income, lost output or reduced earnings resulting from road accidents can be significant. As worry and the restriction of movement, road accidents can also adversely affect the daily life of families.
To improve conditions for pedestrians an integral approach to road safety is required and pedestrian education in schools is an essential part of such an approach. By providing appropriate road safety education materials, teaching approaches, and generally raising the awareness of the importance of road safety among Ministries of Education, teachers and pupils in developing countries the problem can, in part, be addressed.

Results from a survey focusing on road safety education practices, problems, and perceived needs for the future in 1200 schools in Africa and Asia showed that little road safety education was being carried and that children's road safety knowledge was often inadequate.

Transferring developed country approaches to road safety education to developing countries is not necessarily the way ahead. It is important that the methods and materials used in road safety education have been researched and developed in the country that they are being used.

In 1994, TRL undertook detailed research into developing a Road Safety Education Resource for primary school teachers, a Tutor's Pack for teaching teachers about Road Safety Education and a Good Practice Guidelines book for senior level educators and administrators.

Results from a controlled study showed that children exposed to the 'Safe Ways' material had, statistically significantly at the 5 per cent level, improved their road safety knowledge and attitudes over children who had not been exposed to the resource.

Key learning points in the 'Safe Ways' lessons are walking along and crossing roads safely, identifying safe places to cross, and practising safe routes to and from school. The Tutor's manual concentrates on providing tutors all they need to know about Road Safety Education instruction by using workshops. The Good Practice Guide shows how a developing country might establish a sustainable system ensuring that primary school children receive an adequate Road Safety Education. It is principally aimed at policy makers, administrators and senior teachers.

6. REFERENCES


