TRAVEL PATTERNS AND SAFETY OF SCHOOL CHILDREN IN THE ETHEKWINI MUNICIPALITY

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ABSTRACT

Approximately 34 000 pedestrian casualties occur annually on South African Roads. This includes approximately 4000 deaths, 10 000 serious injuries and 20 000 minor injuries, costing the country an estimated R2,55 billion. Child casualties are particularly distressing and preventing them is no easy challenge. The 2003 statistics for the eThekwini Municipality reflects that 38% of all children, in the 0-16 age group, injured in accidents were occupants of either minibuses or LDVs. This could indicate unsafe modes of scholar transport. Furthermore the vulnerability of a child pedestrian is highlighted by the fact that 23% of all pedestrians' casualties were children and 1318 of 1957 children killed were pedestrians (67%).

Statistics confirms that pedestrians are most at risk. School children have been recognized as forming a significant percentage of the pedestrians. It is thus important to understand factors that influence children's travel patterns as an initial step to reduce the accident rate. This paper examines children's travel patterns at primary and secondary schools level in the eThekwini area.

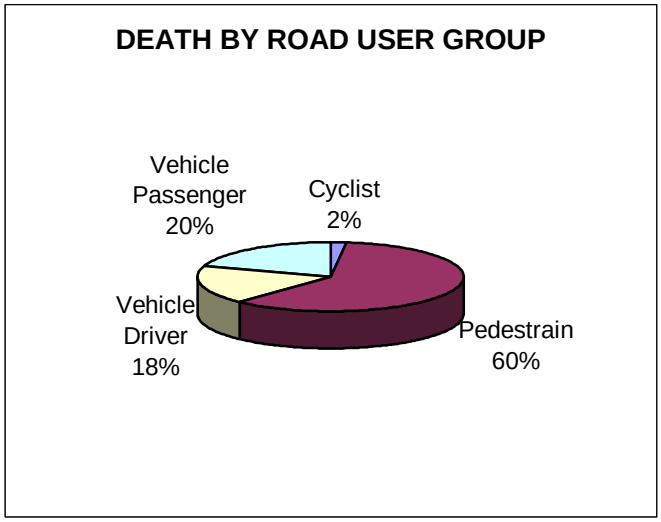
In the absence of statistics regarding education trip-making, a questionnaire survey has been undertaken to determine demographics, mode of travel to school, travel cost and duration, factors influencing alternate modes of travel and problems experienced during school travel in terms of road safety. An on site investigation was carried out to assess engineering aspects inclusive of geometric design, traffic calming, signage and other traffic management aspects. This paper focuses on scholar transport and will discuss the findings of the pilot survey and site investigations.

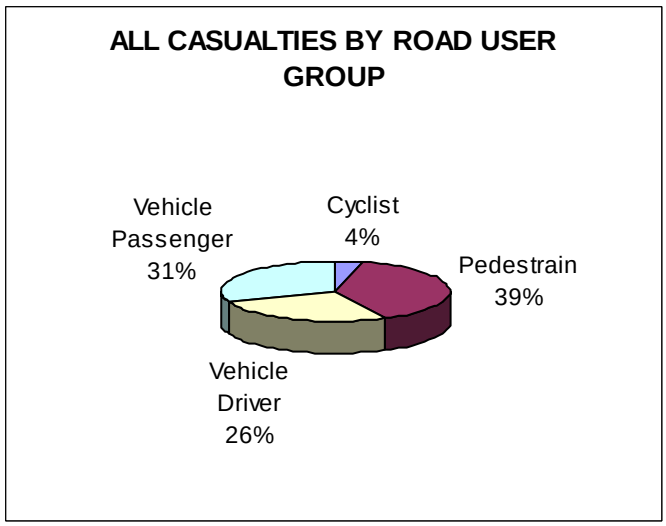
1. INTRODUCTION

Accidents in the eThekwini Municipality during 2003 cost on average an estimated R6 million per day inclusive of hidden cost such as trauma, grief, suffering and inconvenience (eThekwini Transport Authority, 2003). During 1996 a total of 605 children in the age group

0-18 years were killed and 5509 were injured non fatally in traffic collisions involving pedestrians in South Africa (Venter, 2000). Pedestrians in accidents stand a 93% chance of sustaining injuries, while drivers in accidents stand a 5% chance (eThekwini Municipality, 2000). Clearly, the importance of road safety and road safety research cannot be overemphasized.

Figure 1a illustrates that pedestrians make up 60% of deaths while Figure 1b reflects that pedestrian casualties constitute 39% in the eThekwini Municipality. Pedestrian casualties in Gauteng, Western Cape, Eastern Cape and KwaZulu Natal are above the national average. According to the Arrive Alive website, 25% of pedestrian fatalities are children aged 16 years or less (http://www.arrivealive.co.za/pages. asp?mc=info&nc= statspart4) [Accessed 20 January 2005]. It is thus important to understand factors that influence children's travel patterns as an initial step to reduce the accident rate.





Source: eThekwini Municipality 2000

Figure 1a. Death by road user group.

Figure 1b. Casualties by road user group.

1.1 Public Transport and Pedestrians

Safety in not only a problem for public transport passengers in vehicles but also for pedestrians walking along public roads. South Africa has a disturbingly high pedestrian accident record. Many of these pedestrians are public transport users walking to or from bus and taxi stops.

In recent years, bus operators have experienced a significant decline in patronage. This is most probably attributed to the increase in the use of the minibus taxis. National policies aim to improve existing road networks, relieve congestion and encourage the use of public transport. It states, for example, that 80% of commuter trips should be by public transport and that patrons should not have to spend more than 10% of their disposable household income on public transport (Department of Transport, 1996).

In the Durban Metropolitan area, 57% of commuter trips are currently by public transport. However, this varies considerably in different locations with some areas having public transport usage as high as 94% and others practically none at all (Traffic and Transportation Department, 1995).

1.2 Bicycle Use

The author's observation indicates that existing road traffic conditions, infrastructure and terrain in the eThekwini Municipality make it unsafe to ride a bicycle. It is thus not surprising that the level of cycling in the Durban area is low. Yet, the bicycle is one of the most cost efficient mode of transport. Advantages include a benefit to the environment and the people who use bicycles. It is also of interest to note that bicycle sales worldwide are three times as high as that of motor vehicles. Although this research will not be a comprehensive study for the potential of bicycle transport, the study will investigate the potential of bicycle transport to be integrated into the school travel plan.

1.3 Car Ownership

This is closely linked to household income and impacts significantly on the requirements for public transport. In the greater Durban area car ownership is 190 cars per 1000 people. Generally high-income areas showed levels in excess of 400 cars per 1000 people. Lower income areas had levels of less than 100 cars per 1000 population with rural areas tending to be the lowest having only 20 cars per 1000 population. Low-income areas rely heavily on public transport whereas high-income areas would generally make use of private vehicles even though a reasonable public transport system may or may not be available. It is important to reduce the dependency on private transport as this will reduce traffic congestion and the need for investment in capital-intensive road structure (Traffic and Transportation Department, 1995). Traffic congestion leads to pollution, noise, unpleasant aesthetics, increased travel times, reduced pedestrian, bicycle safety and more especially reduced safety where children need to cross the road regularly. As congestion continues to grow, so does the number and frequency of accidents

2. WHY SCHOOL TRAVEL?

School travel is important for a number of reasons. School journeys usually take place at peak times and have the same destination every day. Regular journey patterns are often easier to target with road safety programmes or travel demand management strategies since large numbers of people travelling to the same place at the same time increase not only the efficiency with which safety programmes can be delivered but also the potential for shared services (Morris et al., 2002).

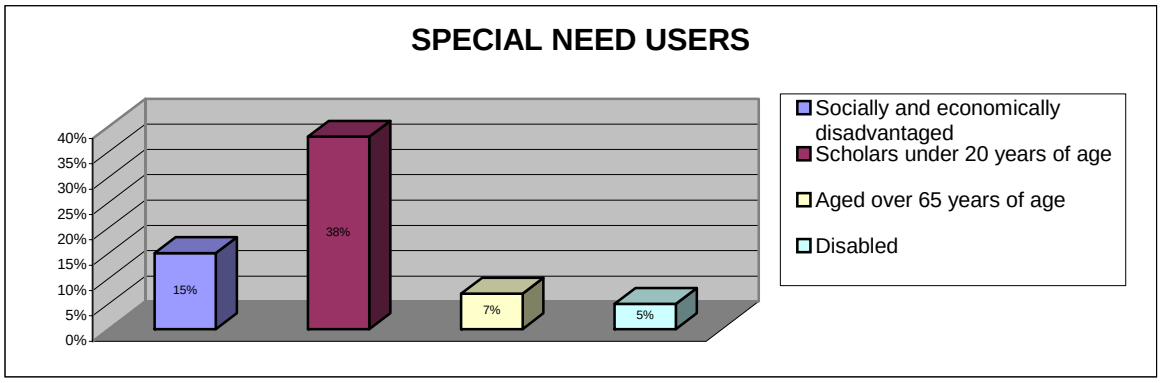


Figure 2. Special user groups in the Ethekwini area.

From the 1996 Population Census special needs groups, divided into four categories for this study, accounted for 65% of the total population. Figure 2 illustrates that scholars make up the largest proportion of “special needs” users (38%). Recent surveys carried out as part of the Fundamental Restructuring Project, indicated that scholars accounted for some 20% of peak hour commuters (Traffic and Transportation Department, 2002).

Unfortunately, in many spheres “road safety” has become synonymous with education of children, and the perception of success or failure of past efforts depends entirely on presentation of statistical information. The limit placed on the role of education is given by Mac Gregor et al (1999) who suggests that children’s accidents arise not because of lack of knowledge, but because children make “mistakes”. As they argue, the answer to this cannot be better education, but to work towards a more forgiving traffic environment.

2.1 Safe Routes to Schools

Internationally safe route to schools is a community approach to:

- Encourage more people to walk and cycle to school safely.
- Improve road safety and reduce children casualty.
- Improve children's health and development.
- Reduce traffic congestion and pollution.

3. SURVEY QUESTIONNAIRE

During June 2004, 500 questionnaires were handed to 5 schools for completion. These schools included:

Name of School	Location	Level	Type
Thandawazi Primary	KwaMashu	Senior Primary	Government
Isibonela Secondary	Kwa Mashu	Secondary	Government
Ferndale Combined School	Phoenix	Primary and secondary	Government
Christopher Nxumalo	Chesterville	Primary	Government
Umlazi Comtech	Umlazi	Secondary	Government

A response rate of 10% was preferred; however an absolute minimum of 8% response rate was accepted for analysis. 4 of the 5 schools satisfied this requirement and therefore Umlazi Comtech was excluded.

The questionnaire was specifically targeted at scholars to establish:

- Demographics
- Mode of travel to school
- Assessment of alternate modes of transport
- Origin, destination and route details.
- Travel cost and duration
- Factors influencing choice of school.
- Problems experienced on route to school in terms of road safety

3.1 Findings

The pilot survey was targeted at government schools in the north and south central areas of the eThekwini Municipality. The road accidents statistics were referenced to a map showing positions of schools. The respondents comprised 61% females and 39% males and varied from Grade 6 to Grade 11.

Figure 3 illustrates that 15% of the households own a bicycle while 43% own a car. If this result was linked to socio economic factors, one would expect bicycle ownership to be greater.

It would appear that the economic, environmental and physical benefit of cycling has not been taken advantage of, because among other reasons the road infrastructure is not conducive to cycling.

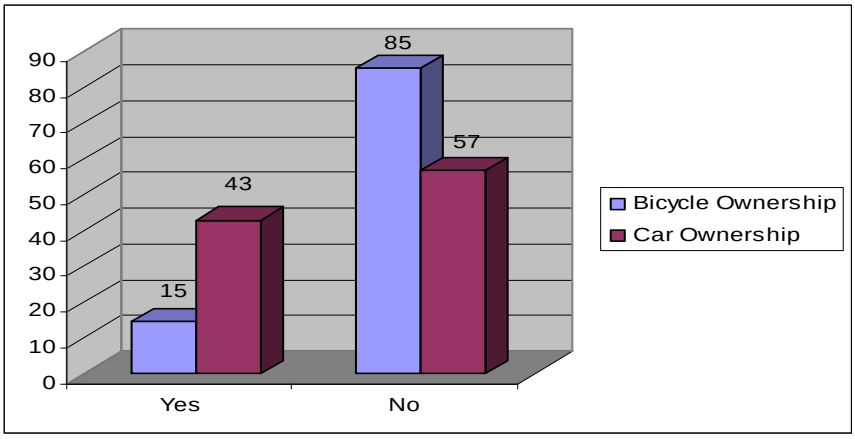


Figure 3. Car and bicycle ownership.

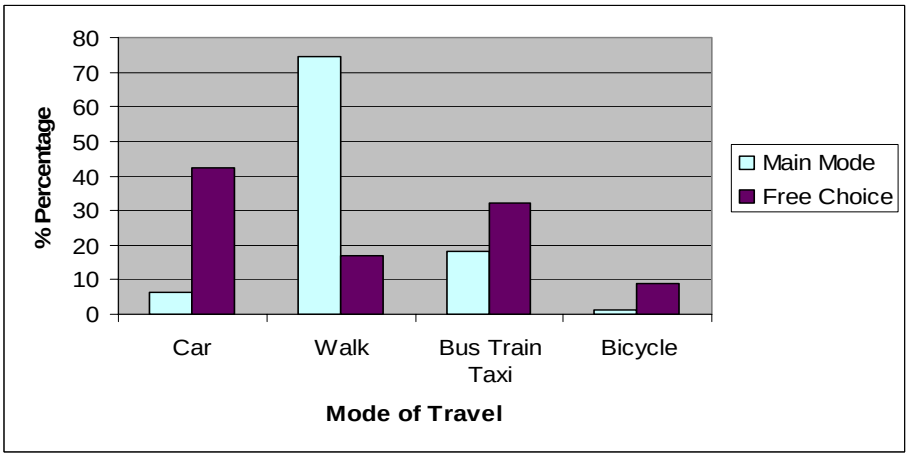


Figure 4. Main mode of travel to school and mode if given a free choice.

Figure 4 above compares the present main mode of travel to school and the mode selection if scholars were given a free choice. Over 70% of the respondent's main mode of scholar travel is walking. If scholars were given a free choice then this percentage drops to under 20%. The pedestrian respondents attributed problems on route to school to driver behaviour, road crossing facilities and fatigue. Approximately 7% of the scholars' main mode of the travel to school is by car. This percentage increases to over 40% if scholars were given a free choice. The notion of convenience over environment, safety and fitness issues needs to be investigated for non motorized travel to be effective. It would appear that as socio economic conditions improve scholars, will prefer to travel by car as opposed to walking.

Table 1. Factors encouraging car share/ lift clubs (%).

Name of School	*1.Help in finding car share partners*	*2.Standby Arrangements*	*3.Reserved parking for car shares*	*4.None*	*5.Other*
Christopher Nxumalo	40	17	30	10	5
Ferndale	26	14	25	29	7
Isibonela	49	15	12	20	5
Thandawazi	24	22	21	19	14
Average	**35**	**17**	**22**	**19**	**7**

Table 1 illustrates the percentage response for each school when investigating the factors that will make scholars more likely to form lift clubs thereby reducing the vehicles on the road. It was established that 35% of the respondents will be more likely to car share if they received assistance in finding car share partners. Schools involvement in this regard will enhance the potential for lift clubs. 19% were not interested in lift clubs.

Table 2. Factors encouraging scholars to walk to school.

	1.More footpaths around your school	*2.More footpaths on the journey to school*	*3.Better road crossing facilities*	*4.More scholar patrol and increased security*	*5.None*	*6.Other*
Christopher Nxumalo	15	20	25	33	5	3
Ferndale	5	21	40	22	9	3
Isibonela	23	10	58	7	2	1
Thandawazi	14	19	19	21	14	12
Average	**14**	**17**	**36**	**21**	**8**	**4**

Thandawazi and Isibonela are in close proximity to one another and a person from the community (points person) assist scholars to cross the road leading to the school.

Table 2 illustrates that on average 36% felt that better road crossing facilities will encourage them to walk to school with Isibonela Secondary contributing to this high percentage (58%). One would have expected Thandawazi Senior Primary to display a higher concern to this factor than Isibonela High School considering the age difference. It was surprising that at Thandawazi, 21% of the scholars' main motivation to walk to school was for more scholar patrols and increased security. This could possibly be attributed to a security issue.

Table 3. Factors encouraging scholars to cycle to school.

	1.Changing Facilities at school	*2.Arrangements to buy a bicycle at discount*	*3.Secure Cycle parking*	*4.Better roads Facilities e.g. Cycle Tracks*	*5.None*	*6.Other*
Christopher Nxumalo	11	18	28	21	18	3
Ferndale	12	9	26	23	24	6
Isibonela	23	10	58	7	2	1
Thandawazi	21	16	17	17	18	12
Average	**17**	**13**	**32**	**17**	**16**	**6**

While secure cycle parking was the main motivation for cycling to school, 16% of the respondents were not interested in cycling to school. It was expected that since bicycle ownership is low, economic factors such as "*arrangements to buy a bicycle at a discount*" will take preference but this was not the case with Table 3 reflecting that on average only 13% were motivated by this. In contrast, 32% of the respondents' main motivation was secure cycle parking and this could be attributed to security concerns in the area. 58% of the scholars at Isibonela Secondary were concerned about the safety of the bicycles.

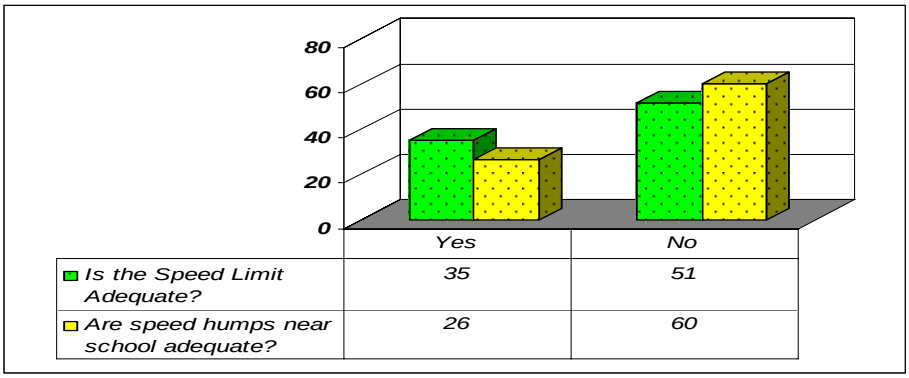


Figure 5. Adequacy of speed limit and speed humps.

On site observation confirms the problems raised by the scholars in terms of speed limits and speed humps near the school. Figure 5 illustrates that 51% perceived the speed limit to be inappropriate while 60% were concerned that the speed humps near schools were not adequate.

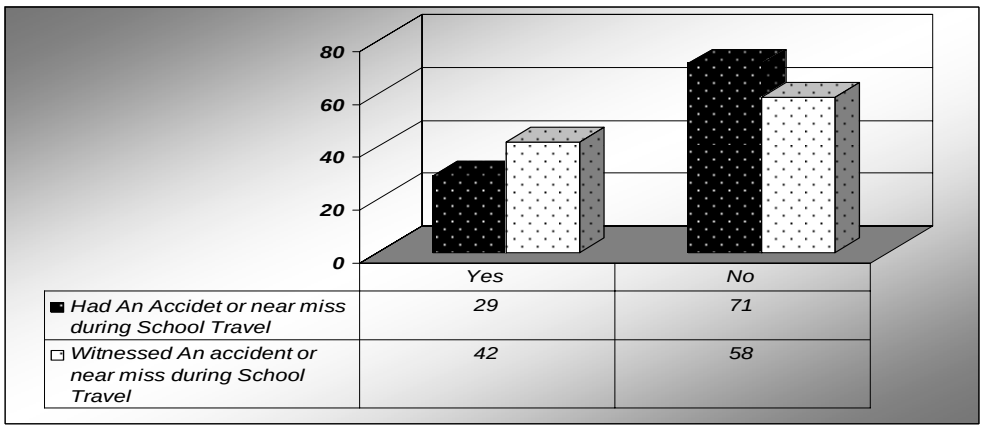


Figure 6. Accidents or near miss at schools.

Figure 6 illustrates that 29% had an accident or near miss during school travel and 42% witnessed an accident or near miss during school travel. Respondents were asked to give details in order for the author to assess whether a near miss was road safety related.

The potential of a walking bus in which children are escorted as a group by trained and approved parents to school was targeted at car users. Collection could be from a convenient collection point such as a hall or car park. Figure 7 illustrates that 55% of the car users responded positively to the use of a "walking bus". This project has the potential to reduce the congestion on roads during peak times thereby reducing the interaction between cars and pedestrians.

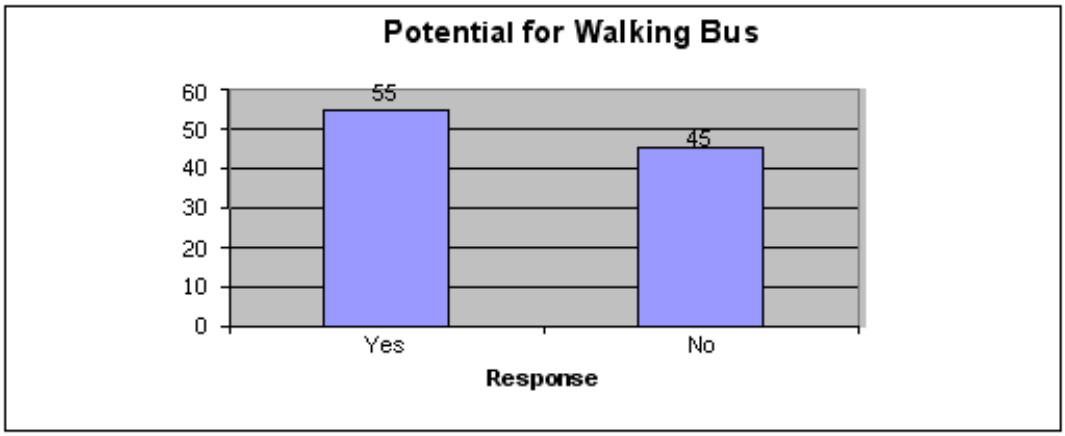


Figure 7. Potential for a walking bus.

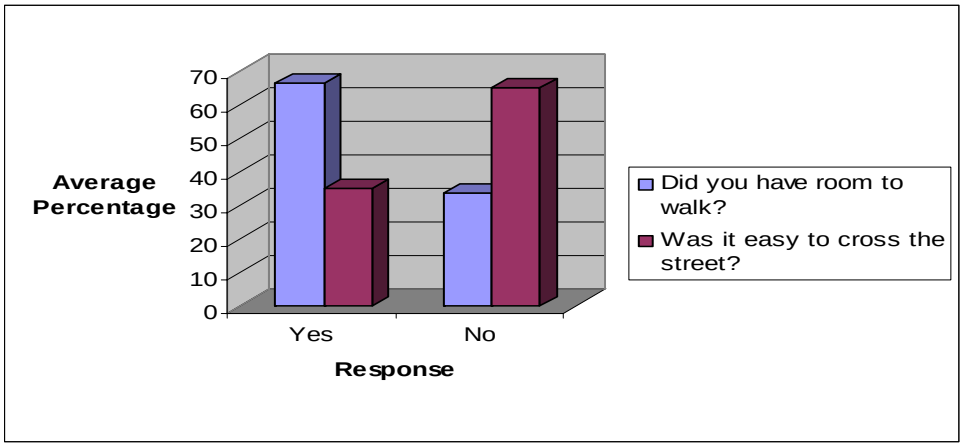


Figure 8. Problems experienced by pedestrians on route to school.

The study also investigated problems experienced by pedestrians on route to school. Figure 8 illustrates that over 30% agreed that there was sufficient room to walk, however over 60% complained that it was not easy to cross streets. On site observation confirms that the number of lanes together with the high volume of traffic makes it difficult for the scholars to cross roads. Internationally and locally a pedestrian crossing gives pedestrians right of way. On site observations and the survey confirms that drivers did not adhere to this law and therefore a high percentage of the scholars felt that drivers did not behave well (69%).

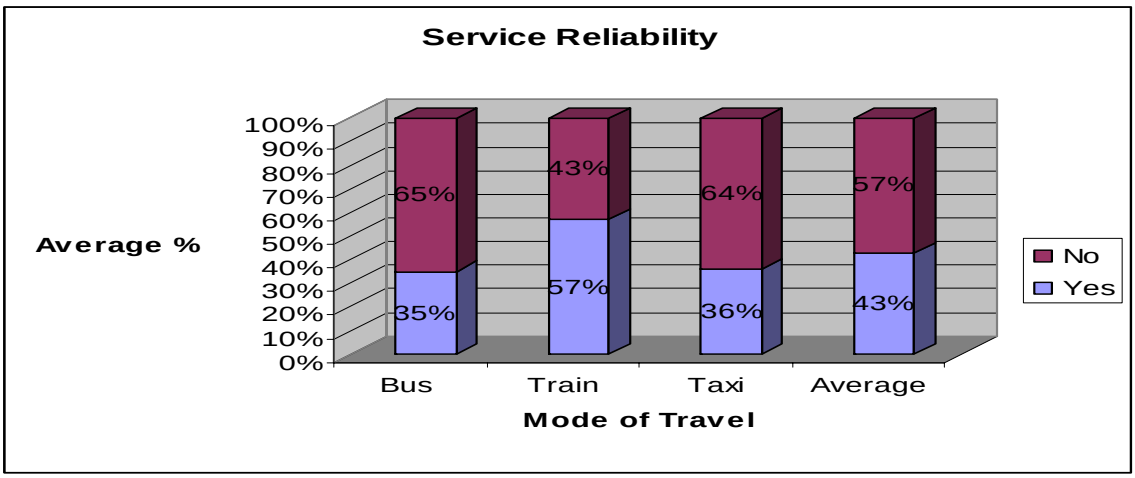


Figure 9. Service reliability.

Figure 9 shows a comparative analysis of the service reliability for bus, train and taxi users. On average 57% of the respondents found the service unreliable. The majority (65%) of the bus users considered the service unreliable while 64% of the taxi users considered the service unreliable. According to the respondents, road based public transport is more unreliable. It would appear that as service reliability increases so too will the preference for travel mode change.

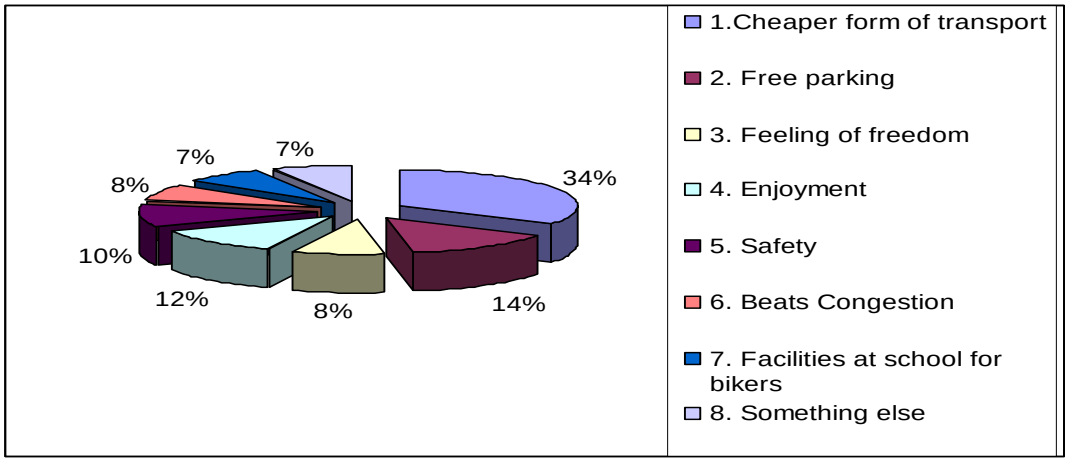


Figure 10. Motivations to cycle to school.

The analysis above (Figure 10) was targeted at the cyclist. The purpose of this was to ascertain the motivation for cycling to school. The main motivation for cycling to school was that it was a cheaper form of transport (34%).

4. SITE ASSESSMENT

An on site assessment was conducted as part of the research. This included condition and geometrics of the road, signage, traffic calming, entrance facilities at school, formal travel plan.

The assessment confirmed the following:

- Speed limits in 4 of the 5 schools were considered undesirable.
- Generally, signage included a school marking on the road and a pedestrian sign. Signage associated with traffic calming e.g. reduction in speed, speed humps etc were lacking.
- On site observations confirm that crossing the street was difficult. KwaMashu and Mangosuthu Highways were considered too wide. The speed limit of 60km/hr was generally not adhered to.
- None of the schools had any bicycle racks.
- None of the schools had a formal school travel plan.
- School officials were appointed in 3 of the 5 schools to assist learners crossing at the entrance of the school during mornings and afternoons.

5. CONCLUSION AND RECOMMENDATIONS

A holistic approach to road safety encompasses Engineering, Education, Enforcement and Encouragement.

5.1 Role of the Community and School Involvement

- Schools need to play a more active part to reduce accidents by formulating a travel plan.
- The Road Traffic Act (Act 93 of 1996) section 57.5 states that scholars can be organized into patrols so that the safety of pedestrian crossing on a public street or road can be ensured.
- Parents and educators should be encouraged to assist by volunteering their assistance with projects such as “walking bus” and “walk to school” projects.
- Road safety training should begin with practical training preferably at the roadside involving educators, parents and the community. This education could be enhanced using the latest technology.
- The appointment of a road safety co-ordinator in each school who is also a member of the road safety committee will assist with the implementation of appropriate programmes.
- Schools could assist parents in finding lift club partners.

5.2 Municipalities

- Stricter Laws and aggressive *enforcement* and adjudication of reasonable speed limits.
- A more forgiving traffic environment for school travel can be achieved by introducing signage and traffic calming measures for school zones e.g. the introduction of a 40km/hr speed limit on the school approach road. To formulate a traffic safety plan for school zones.
- Encouraging the communities, schools, researches, municipalities, NGO’s and government to work together to build a safe South Africa and to coordinate the efforts of each.
- Organizing events (workshops, road shows) to raise public awareness on speeding and driving safely.
- A traffic signal at the entrance to Umlazi Comtech is highly recommended considering the volume of traffic on the Mangosuthu Highway.
- Internationally, authorities are using a number of different approaches to encourage schools to adopt travel plans. Some are targeting schools wishing to expand and requiring them to produce a travel plan in return for planning permission while others are targeting schools which have particular problems with congestion or parking. Similar approaches could be considered in South Africa.

This survey will be extended to incorporate schools of different classifications and age groups. A qualitative exploration of children’s perspective of the road environment should be encouraged combined with observations of their road crossing behaviour outside schools recorded on video. Studies have shown that children sometimes misperceived the functions of engineering measures and interacted with them in ways that a designer may not have anticipated (Lupton et al, 2002). From a traffic congestion and road safety point of view, data regarding scholar travel is still very limited and more surveys of this nature need to be undertaken to reduce accidents.

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