

# Pedestrian traffic injuries among school children in Kawempe, Uganda

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## Abstract

### Background:

Traffic injuries are an important problem in low income countries. In Uganda road traffic is the largest single cause of injury in Kampala; pedestrians, and children are most affected. Pedestrian injury affects school children in Uganda.

**Objective:** To determine the overall risk of pedestrian traffic injury among school children in Kawempe, Uganda.

**Methods:** A cohort was assembled at 35 primary schools and followed for 3 terms. Ten of the schools had participated in previous injury programs, others were systematically selected. Injuries were recorded by teachers using a questionnaire. Data collected included ID, school, age, grade, gender, incident date, vehicle type, and injury outcome. Demographic characteristics are described and cumulative incidences calculated.

**Results:** The cohort included 8,165 children (49% male) from 35 primary schools. The mean age was 9 years (Sd=2.78). Of the 35 schools, 92% were day; the others mixed day and boarding. 53 children (27 girls) were involved in a traffic incident. 25% of the injuries reported were serious and warranted care in a health facility. No deaths occurred. Forty % of incidents involved commercial motorcycles, 41% bicycles, 9% cars, 8% taxis, and 2% trucks. The cumulative incidence was 0.168% each term. Over the 3 terms of the year the cumulative incidence was  $0.5 \pm 0.02$ . There were no gender differences in the cumulative incidence.

**Conclusion:** Each school year about ½ % of Kawempe school children are involved in a traffic incident. Interventions are necessary to reduce the unacceptably high incidents of pedestrian traffic. Interventions to alleviate this situation including safer routes, teaching skills of road crossing to children as well as better regulation and road safety education to two wheelers could reduce the unacceptably high incidents of pedestrian traffic injury.

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## Introduction

Road Traffic Injury (RTI) is an important cause of global morbidity and mortality in adults and children. The traffic injury death rates vary among the regions and socio-economic settings. In Turkey, the child pedestrian death rates were estimated at 6.4 per 100,000 population<sup>1</sup>. The high traffic injury rates in developing countries reflect high pedestrian populations, rapid motorization, and poor road infrastructure<sup>2</sup>. Pedestrians are susceptible representing 70% of traffic fatalities in developing countries, and the larger proportion of traffic injuries on urban roads<sup>3</sup>. In Ghana, pedestrians accounted for 46.2% of all road traffic fatalities<sup>4</sup>. A hospital based study done in Uganda shows a similar pattern with RTI as the largest single cause of severe injury with pedestrians (43.5%) and pedestrian children (68%) and adolescents (mean age 27.2 years) to be most affected<sup>5</sup> in Kampala.

The high risk of traffic injuries among pedestrians is attributed to several environmental, developmental, and socio-demographic factors<sup>6</sup>. Roads in developing countries often have mixed traffic, poor illumination, and signposting, poor maintenance, and roadside hazards. Mexican studies have identified dangerous crossings, absence or inadequate pedestrian bridges, and negative perceptions of road safety by pedestrians as risk factors associated with high pedestrian injury rates<sup>7</sup>: another study also identified high vehicular traffic, invasion of cars, and vendors in pedestrian areas as risk factors<sup>8</sup>. High level risky pedestrian and driver road behavior and inadequate infrastructure for safe mobility of pedestrians were identified in a Colombian study<sup>9</sup>. In Uganda, we established that the environment under which children attended school was not safe and put children at risk for injury<sup>10</sup>.

The greater vulnerability of children compared to adults has been attributed to their developmental and behavior limitations in complex traffic situations<sup>11</sup>. Pedestrians aged 10 years and below are particularly vulnerable because of their small physical size and

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underdeveloped abilities to dealing with traffic situations, both cognitive (attention focus, interpreting signs) and perceptual (locating sounds, judging speed, peripheral vision)<sup>12</sup>. Children under the age of 10 years do not have the ability to cross roads without adult help. Children's capacities are poorer than adults to perform street crossing tasks, particularly scanning the environment as a whole<sup>13</sup>: the more the complexity of the traffic environment, the more difficult the task and therefore the vulnerability of children 0-10 years could be attributed to the fact that they may not have attained the maturity for pedestrian road use. Studies in New Zealand, showed that children aged 5-9 years make a greater number of unsafe road crossings than the older children<sup>14</sup>. Safe pedestrian behavior relies on cognitive skills, including the ability to focus attention on the traffic environment and ignore irrelevant stimuli. The ability to identify safe and dangerous road crossings and to resist interference increases with age thus for young children this would be difficult<sup>15</sup>. WHO gender differences in childhood traffic injuries have also been identified with boys being more likely to be injured than girls<sup>16</sup>.

Walking has been encouraged because studies have shown that increased walking alleviates traffic congestion, saves energy, reduces pollution, conserves land, and produces environmental benefits<sup>17</sup>. Children who walked to school in the United Kingdom were significantly physically more active than those who traveled by car. However, road danger is a strong disincentive to active transport (walking, cycling) thus contributes to increasing levels of childhood obesity<sup>18</sup>. Although walking has been positively supported, some studies have showed an increase in pediatric traffic injury as children walk to school. Children are exposed to the risk of pedestrian injury only while walking. A hospital based study conducted in Tanzania found that over 73% of children injured by road traffic were walking to and from school, thus making children more susceptible to road traffic injuries<sup>19</sup>. Another study done in Uganda, showed that 90% of the children in Kawempe, Kampala walk to schools located within 100 meters of a main road, and that this puts children at risk of traffic injuries<sup>10</sup>.

This study investigates the magnitude and overall risk of a child pedestrian traffic injury in urban Uganda.

## Methods

A cohort of 8,165 children selected from (35) representative primary schools was followed up for three school terms. Through purposive and convenient sampling, 10 of the schools were chosen because of past participated in previous injury prevention programs and

others systematically selected to be representative of the different zones in Kawempe division. Road traffic injuries occurring among the children were recorded by specifically trained teachers using a questionnaire. Questions on exposure were not asked, exposure was just defined based on activity. Follow up was conducted during the third 2004 school term (October-November), and the first and second 2005 school terms (February-March; April and June respectively). The third and first school term data collection lasted for only 2 months as compared to the second school term. Personal identifiers included name, school, age, grade, and gender; other data collected were incident date, vehicle type, and injury outcome. Data was analyzed using stata 8 statistical software. The pupil demographic characteristics are described using frequencies; significance tests were done using chi-square; and cumulative incidence rates are calculated per term adjusting for the seven months of term time covered during data collection. The study was conducted in Kawempe; a division of Kampala city with a total population of 268,659, approximately 200 primary schools. The division has a mix of urban and peri-urban settings.

## Ethical Issues

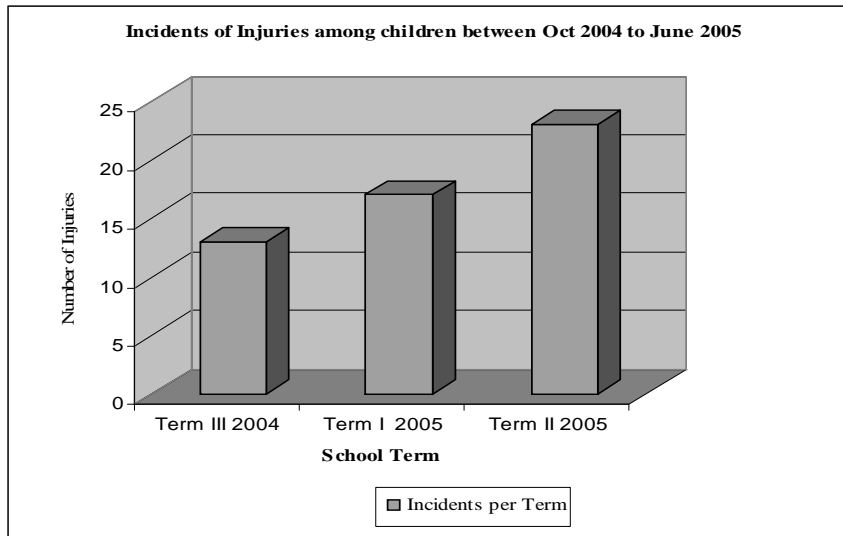
Permission was granted by the division education authorities; assent was also obtained from children.

## Results

A total of 8,165 children from 35 representative primary schools were followed for three school terms; 49 % of them male. The mean age of the boys and girls was both 9 years (Sd=2.78, Min=3, Max=14). Ninety two % of the schools were day and the rest were mixed day and boarding primary schools.

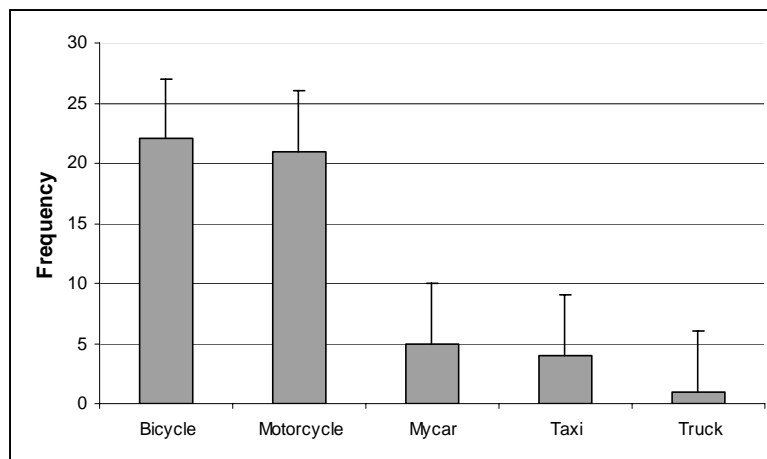
Fifty three children were involved in traffic crashes over the study period; 51% of the injured were girls, giving an overall cumulative incidence rate of 0.168% each term. Over the three school terms of the school year the cumulative incidence rate was  $0.5 \pm 0.02$ . There were no gender differences in the cumulative incidence rates. The distribution of incidents per term is presented below.

**Fig 1: Incidents per term**



Twenty five (25%) of injuries sustained by the children were serious and warranted care in a health facility: one of the children sustained a fracture and no deaths were reported. The vehicles involved are presented below:

**Fig. 2: Type of vehicle involved**



### Discussion

The results showed that Kawempe primary school children face an unacceptable risk of traffic injury on their way to and from school with the greatest risk emanating from commercial motorcyclists and bicyclists. This makes walking a very dangerous means of accessing schools further denying the children the additional beneficial health effects such as reduction in chances of childhood obesity<sup>18</sup>.

The study shows the risk of traffic injury for girls to equal boys. This is different from other studies<sup>16</sup> which showed more boys are injured in traffic than girls. The injured children had a mean age of 9 years regardless of gender, further confirming earlier results which

indicated that children below 10 years are not mature enough to make a well thought out decision regarding traffic<sup>13, 14</sup>. This gives further support to the call for children below 10 years to be accompanied to school by adults.

The months of the second school term recorded the highest number of pedestrian injuries; this could be attributed to the longer time children spend at school during this term. This study also showed motorcycles and bicycles as the lead cause of traffic injuries among the children. This is consistent with ICCU hospital based studies (unpublished) that also show two wheelers as an important cause of traffic injuries in

Kampala. Two wheelers are a growing means of transportation in Kampala.

The cumulative incidence rate of childhood traffic injuries shows a high overall traffic injury risk. The risk of injury for these children over the 3 terms of each school year is a ½ percent Kampala children have to face in order to access formal education and further underscoring the unsafe conditions they learn under.

One of the study limitations is that the study needed to be bigger in order to determine the risk factors for pedestrian school going children. In this case it was small and representative to bring out the overall risk that an average child going to and from school is likely to experience. The other limitation is that there is a likely underestimation in the incidence rate due to absenteeism which has not been adjusted for. The other limitation worth mentioning is the fact that teacher- pupil reporting still remains elusive due to cultural validity.

### Preventive Implication/Recommendations

Each school year about ½ % of Kawempe school children are involved in a traffic incident. An average child in a primary school in Kampala is at risk of a traffic incident. Each incident was a potential serious injury or death, therefore, Ugandan children need better protection on their way to and from school.

Interventions to alleviate this situation including safer routes, teaching skills of road crossing to children as well as better regulation and road safety education to two wheelers could likely reduce the unacceptably high incidents of pedestrian traffic injury.

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### References:

1. Goren, S, Subasi, M, Gurkan, F, Tirasci, Y, Acar K. Child pedestrian fatalities in Diyarbakir, Turkey. *Saudi Medical Journal* 2005; 26 (7): 1116 - 1118.
2. Berger, LR, Mohan, D. *Injury Control: A global view*. Oxford. Oxford University Press. 1996.
3. Mutto, M, Kobusingye, O, Lett, R. The effect of an overpass on pedestrian injuries on a major highway in Kampala, Uganda. *African Health Sciences* Dec 2002; 2 (3): 89-93.
4. Afukaar FK, Antwi P, Ofosu-Amaah S. Patterns of road traffic injuries in Ghana: Implications for Control. *Injury Control and Safety* Mar - June 2003; 10 (1-2): 69 -76.
5. Andrews CN, Kobusingye OC, Lett R. Road traffic injuries in Kampala. *East African Medical Journal* 1999; 76 (4): 189 - 194.
6. Rudiger Von Kries, Khone C, Olaf Bohm, Hubertus Von Voss. Road injuries in school age children: relation to environmental factors amenable to intervention. *Injury Prevention Journal* 1998; 4: 103 - 105.
7. Hajar, M, Vazquea-Vela, E, Arreloa-Risa C. Pedestrian traffic injuries in Mexico: a country update. *Injury Control and Safety Promotion* 2003; 10 (1- 2): 37 - 43.
8. Hajar, M, Trostle, J, Bronfman, M. Pedestrian injuries in Mexico: a multi-method approach. *Social Science Medical Journal* 2003; 57 (11): 2149 - 2159.
9. Rodriguez DY, Fernandez, FJ, Acero Velasquez, H. Road traffic injuries in Colombia. *Injury Control and Safety Promotion Journal* Mar - Jun 2003; 10 (1-2): 29 - 35.
10. Nakitto M, Mutto M, Lett R. Environmental hazards and access to injury care at 20 primary schools in Kampala, Uganda. *African Safety Promotion: A Journal of Violence and Injury Prevention* 2006; 4 (3): 59 - 68.
11. Schieber, RA, Thompson JN. Development risk factors for childhood pedestrian injuries. *Injury Prevention Journal* Sept 1996; 2 (3): 228 - 236.
12. Cross, DS, Hall, M. Child pedestrian safety: the role of behavioral science. *Medical Journal of Australia* 2005; 182 (7): 318 - 319.
13. Odeleye, JA. Improved road traffic environmental for better child safety in Nigeria. (submitted presentation at the 10<sup>th</sup> international Conference on traffic safety on two continents, 1999, eds. VTI, Sweden.
14. Simpson, G, Johnston L, Richardson, M. An investigation of road crossing in a virtual environment. *Accident Analysis and Prevention* 2003; 35 (5): 787 - 796.
15. Tabibi Z, Pfeffer, K. Choosing a safe place to cross the road: the relationship between attention and identification of safe and dangerous road crossing sites. *Child Care Health Development* 2003; 29 (4): 237 - 244.
16. World Health Organization. Gender and Road traffic injuries. *Gender and Health Bulletin*. Jan 2002, Geneva. Dept of Gender and Women's Health., Switzerland.
17. Pucher, J, Dijkstra, L. Promoting safe walking and cycling to improve public health: lessons from the Netherlands and Germany. *American Journal of Public Health* 2003; 93 (9): 1509 - 1516.
18. Sonkin, B, Edwards P, Roberts I, Green J. Walking, cycling and transport safety: an analysis of child road deaths. *Journal of Research and Social Medicine* 2006; 99 (8): 402 - 405.
19. Museru LM, Leshabari, MT, Mbembati NAA. (2002). Patterns of Road Traffic Injuries and Associated factors among school age children in Dar-es-Salaam, Tanzania. *African Safety Promotion: A Journal of Injury and Violence Prevention* 2002; 1 (1): 37 - 41.
20. Nakitto M, Mutto M, Lett R. Environmental hazards and access to injury care at 20 primary schools in Kampala, Uganda. *African Safety Promotion: A Journal of Violence and Injury Prevention* 2006; 4 (3): 59 - 68.