

## Injury Management in High Schools in Kenya

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### Authors' contributions

*This work was carried out in collaboration between all authors. Author PNW designed the study, wrote the protocol and wrote the first draft of the manuscript. Author JTM managed the literature searches. Author EG managed the statistical analyses of the study while author EM managed the literature review and corroborated the discussion section. All authors read and approved the final manuscript.*

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### ABSTRACT

**Background:** There is shortage of knowledge on the methods used to manage injuries in high schools in Kenya.

**Objective:** To describe the injury management intervention practice in high schools in Kenya.

**Methods:** Injury related data was collected in year 2010 from 287 nationally representative high schools through self-administered questionnaires and interviews.

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Participants were asked about injuries that had occurred in their schools in the preceding 12 months. The injuries were coded using classification methods derived from ICD – 10.

**Results:** Slightly less than half of the schools (49%, n=141) kept and updated students health records. In total, 3505 injuries were reported to have been sustained by the students resulting to an injury rate of 3.99 per 100 students per year. The rate of injury was higher among boys (4.79 injuries per 100 students) than among the girls (3.19 injuries per 100 students, RR 1.50; 95%CI: 1.41 – 1.60; p<0.001). About 30% of schools had no caregivers with only 58% of District schools engaging them. Only 18% of care givers had been trained on injury management. The study showed that 11% of the schools had no First Aid kits, 54% had no sanatorium and only 15% of District schools had a sanatorium.

**Conclusion:** High school students incur significant number of injuries and all schools should be prepared on the injury management. This study suggests that every school should formulate consistent injury management policies to address consistent post injury management procedures.

*Keywords: Caregiver; first aid; high school; injury; sanatorium.*

## **ABBREVIATIONS**

*RR- Rate Ratio; IPR- Injury Proportion Rate; CI- Confidence Interval; CDF- Constituency Development Fund.*

## **1. INTRODUCTION**

High school student's injuries can result in loss of study times, doctor and hospital visits and increased health related costs [1]. Injury is a leading cause of death and disability worldwide and a major concern in clinical and public health. Among all population groups, the most vulnerable to suffer injuries are young groups from developing countries [2]. There is therefore an urgent need to develop, strengthen and maintain capacity for injury prevention, research and practice [3].

There are about 1.5 million students attending high school regularly in about 8,500 schools in Kenya. The school mapping data shows that the total number of secondary schools increased by 91.5% from 4339 in 2005 to 8309 in 2010 [4]. The increase in number of schools is attributed to Constituency Development Fund (CDF) and the Education Policy Framework that aims at achieving Education for All (EFA) by 2015 [5]. Despite the government commitment through the Ministry of Education in appreciating school safety for all children, inappropriate school facilities and infrastructure lead to injury occurrences in schools.

In Kenya, as in many other countries, high schools are either Government supported mainly financially (Public) or privately owned institutions. Government funded schools are divided into National, Provincial and District levels. Students with the highest scores after taking the final primary school (KCPE) examination gain admission into National schools, while those with lesser scores are selected into Provincial and District schools respectively. National schools are generally older, well established schools with better learning and teaching facilities [5].

High school student's injuries can result in loss of study times, doctor and hospital visits and increased health related costs [6]. Injury is a leading cause of death and disability worldwide and a major concern in clinical and public health [7]. Among all population groups, the most vulnerable to suffer injuries are young groups from developing countries [2]. There is therefore an urgent need to develop, strengthen and maintain capacity for injury prevention, research and practice [3].

Despite the high burden of injuries in the developing countries, systematic address on injury control through policies and programs is slow [8]. This lack of pragmatic and policy response to injury is in part due to lack of population based and national estimates of injuries prevalence. The main sources of information on injuries in developing countries are Hospital based statistics and police records [9].

In case of an illness or injury of a student, school management would be expected to undertake First Aid as reasonably as it can and take reasonable steps to turn the sick person over to the physician or to those who will look after them [10]. Since a school administration has voluntarily taken students into custody, it should aspire to take reasonable action towards student at all times.

In this study, we described and compared injury management interventions that are carried out in the four main school categories in Kenya, the National, Provincial, District and Private schools.

Specifically, we;

- (i) Calculated injury rates in Kenya high schools in 2010
- (ii) Described available health care facilities in schools for injury management.

Judicious management of injuries improves their progress. Three key players in injury management is the First Aider, the First Aid kit and the school's sanatorium.

Understanding the availability of the three in a school is an important step in development of targeted evidence-based interventions to reduce injuries in schools.

## 2. METHODS

A descriptive survey research design was carried out in the 8 provinces in Kenya from where 287 high schools were selected from about 6500 schools that had been registered by the ministry of Education by January, 2010. The schools in Kenya are categorized by Ministry of Education as National, Provincial, District (referred to as Public schools) and Private schools. Seven National schools, 92 Provincial, 85 District and 103 Private schools were disproportionately selected [11] from the 8 provinces as shown in Table 1.

**Table 1. Number schools selected from each province in Kenya**

Province	No. of private schools	No. of public schools	Sample size $n_k$ of private schools	Sample size $n_k$ of public schools	Total
Coast	135	145	6	9	15 (5%)
Central	367	695	11	18	29 (10%)
Eastern	571	707	26	34	60 (21%)
Nairobi	290	48	17	12	29 (10%)
Rift valley	746	806	21	49	70 (24%)
Western	261	429	8	17	25 (9%)
Nyanza	485	746	11	36	47 (16%)
North Eastern	21	36	3	9	12 (4%)
Total	2876	3612	103(36%)	184 (64%)	287(100%)

### 3. ETHICS AND CONSENT

Approval for this work was obtained from Ethics Committee, Board of Post graduate Studies, Jomo Kenyatta University.

The study protocol was approved by National Council of Science and Technology (NCST) Kenya [12].

Every Head Teacher (Principal) of selected institution was briefed on research details before commencement of data collection and asked to provide informed consent. Emphasis to participate or withdraw from the study was made by the researchers to the respondents. Where a school had health caregivers such as a nurse, the consent to interview them and gain access to their health records was sought from the Principal.

### 4. SAMPLING AND DATA COLLECTION METHODS

A stratified random sampling procedure was used in the study to ensure each category of schools was equitably selected. Each of the eight provinces of Kenya was taken as a stratum. The number of schools per category in each province was determined through the formula of optimum sizes of disproportionate random samples [11] and the results shown in Table 2.

**Table 2. Gender distribution of students from responding schools**

School category	No. of schools	Boys	Girls	Total	Mean No. of students per school
District	85	15,590	13,001	28,591 (21%)	336±197
Provincial	92	35,666	28,565	64,231 (48%)	698±204
National	7	4,626	1,600	6,226 (15%)	889±161
Total	184	55,882	43,166	99,048 (72%)	538±276
Private	103	18,022	20,708	38,730 (28%)	376±245
Total	287	73,904	63,874	137,778	480±276

### 5. DEFINITION OF INJURY

An injury was defined [13] as a physical damage done to a person or part of their body. For purpose of this study, an injury was defined as one that met the following three criteria's:

- (i) Occurred within the school or when the students were undertaking a school activity.
- (ii) Required medical attention from the school's health care giver (where school had one).
- (iii) Resulted in student staying out of school for at least one day.

A healthcare giver was defined as a medical worker in a school or an allied health professional who assisted management of an injury or illness in a school. This person must not be a student in the school and the school delegates the role of managing health needs of the students within the limits of a school to him/her. Auxiliary caregivers were students who supported the schools healthcare giving system by providing healthcare assistance.

The screening question was "How were the injuries that occur in your school managed?"

## 6. STATISTICAL ANALYSIS

The data were analyzed by using SPSS 14.0 (SPSS, Chicago, IL) software where Chi square test was used to assess relationship that existed among schools of various categories and given variables. Rates of injury were calculated as the ratio of injuries per 100 students. Injury rate ratio (RR) and Injury proportion Rate (IPR) were calculated with 95% confidence interval (CI and  $p < .05$  were considered statistically significant). An RR or IPR  $> 1.00$  suggests a risk association, whereas an RR or IPR  $< 1.00$  suggests a protective association. All rate calculations and analyses for injuries used unweight case counts.

## 7. RESULTS

### 7.1 General Characteristics of High Schools Injuries

During the one year period of 2010 school year that the data was collected 3,505 injuries were sustained by 87,754 students, for an injury rate of 3.99 injuries per 100 students. The rate of injury was higher among boys (4.79 injuries per 100 students) than among the girls (3.19 injuries per 100 students, RR 1.50; 95%CI: 1.41 – 1.60;  $p < 0.001$ ).

### 7.2 Healthcare Givers in Schools

All National schools had trained nurses though 42% and 31% of District and Private schools had none as Table 3 shows.

**Table 3. Health care givers in schools**

Category of school	Caregivers					Total
	Matron	Nurses	Teachers	Others	None	
National	0	100%	0	0	0	100%
Provincial	41%	23%	15%	2%	18%	100%
Private	22%	22%	20%	6%	31%	100%
District	16%	15%	15%	11%	42%	100%
Total	26%	20%	16%	6%	30%	100%

The IPR for Nurses in National schools as the caregivers compared to District Schools (15% IPR, 6.67; 95% CI 5.08 – 6.67,  $P < 0.001$ ), Provincial schools (23% IPR, 4.35; 95% CI 3.55 – 4.34,  $p < 0.001$ ) and Private Schools (22% IPR, 4.55; 95% CI 3.69 – 4.55,  $p < 0.001$ ) who had Nurses.

The study showed that there existed two major categories of auxiliary caregivers – the Club based volunteers and the administration selected auxiliaries (Table 4).

**Table 4. Auxiliary caregivers in schools**

Category of school	Prefects	Red cross	Scouts/ Rangers	None	Total
National	57 %	14%	14%	14%	100%
Provincial	2%	21%	45%	33%	100%
Private	2%	7%	45%	47%	100%
District	0%	5%	26%	69%	100%
Total	3%	11%	8%	48%	100%

Most of the National Schools (57%) had prefects as their auxiliary caregivers but overall, prefects gave health care services to only 3% of the schools. However, 48% of schools, among them 69% of District schools had no auxiliaries. Provincial schools had more Club based caregivers (66%) than did the National Schools (14%, IPR, 2.46; 95% CI 1.76 – 3.48,  $p < 0.001$ ).

A greater proportion (Table 5) of schools had both caregivers and auxiliaries working together (45%) compared to those who had neither caregivers nor auxiliaries (16%; IPR, 2.81; 95% CI 1.69 – 4.87,  $p < 0.001$ ).

**Table 5. Caregivers and auxiliary caregivers**

School category	Caregivers and auxiliaries	Caregivers only	Auxiliaries	None	Total
National	86%	14 %	0%	0%	100%
Provincial	62%	27%	7%	4%	100%
Private	47%	25%	11%	17%	100%
District	20%	8%	15%	27%	100%
Total	45%	29%	10%	16%	100%

The study showed (Table 6) that in most of the schools (59%), among them 82% of District schools did not have caregivers or auxiliaries who had been trained on skills and services to offer First Aid to the injured. Though the National Schools had their caregivers and auxiliaries trained, Provincial Schools (37%; IPR, 1.29; 95% CI 1.17 – 1.29,  $p < 0.001$ ), District Schools (16%; IPR, 5.56; 95% CI 4.37 – 5.54,  $p < 0.001$ ) and Private Schools (38%; IPR, 2.63; 95% CI 2.28 – 2.63,  $p < 0.001$ ) did not have trained caregivers.

**Table 6. Schools with or without trained caregivers or auxiliaries**

School category	Trained caregivers or auxiliaries	No trained caregivers or auxiliaries	Total
National	100%	0%	100%
Provincial	63%	37%	100%
District	18%	82%	100%
Private	38%	62%	100%
Total	41%	59%	100%

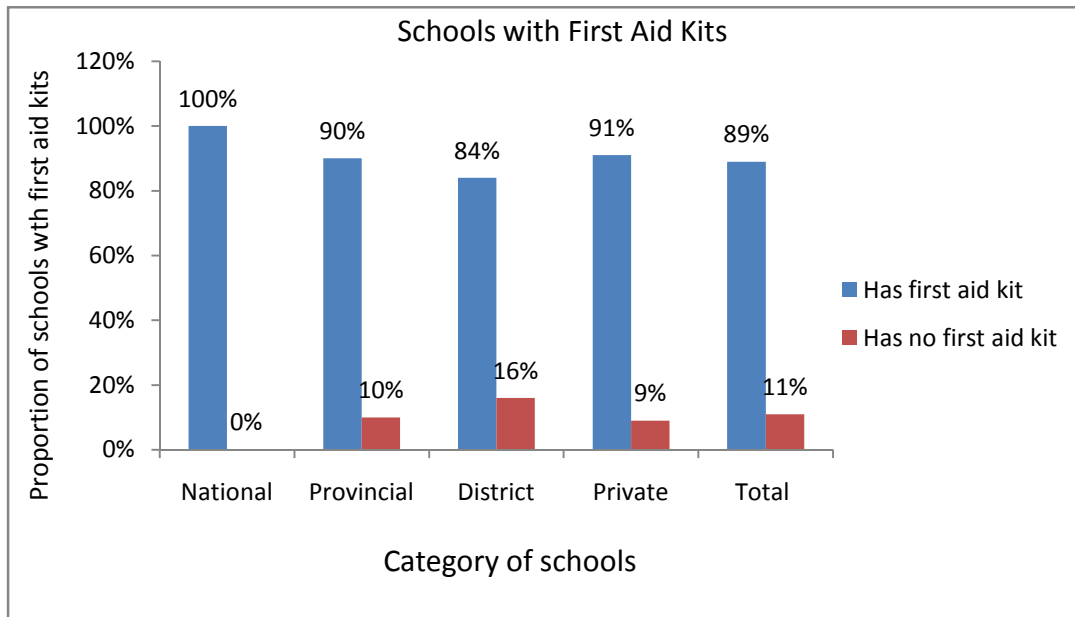
Sports related activities were second only to falls in the injury causation. They led to 29% and 31% of injury causation agents respectively. The study observed that most of the schools (47%) had sport masters (teachers who handled sport activities in schools) being in charge of the Sports related injury cases though only 14% of them had been trained (Table 7). No school had a nurse escorting school teams on sporting activities.

**Table 7. Medical care provision during games and sport activities**

School category	Teacher	Scout	Red cross	None	Total
National	43%	43%	14%	0%	100%
Provincial	47%	18%	13%	22%	100%
District	52%	24%	8%	16%	100%
Private	44%	22%	5%	30%	100%
Total	47%	22%	9%	23%	100%

There was no statistically significant difference in proportions of the schools that relied on sport masters/mistresses to provide First Aid during sporting activities. When the schools of other categories were compared with District schools where 52% of the medical care was provided by the teachers, the outcome was that the Provincial Schools (47%; IPR, 1.11; 95% CI 0.82 –1.49, p=0.57), National Schools (43%; IPR, 1.21; 95% CI 0.87 –1.66, p=0.257) and Private Schools (44%; IPR, 1.18; 95% CI 0.87 –1.61, p=0.32) hence no significant difference.

Most of the schools (89%) had at least one First Aid kit though 16% and 10% of provincial and district schools respectively had none at all (Fig. 1).



**Fig. 1. Estimated proportion per school category of schools with at least one First aid kit**

All National Schools had at least one First Aid kit and there was statistically significant difference in proportions of the schools that had at least one; Provincial Schools (90%; IPR, 1.11; 95% CI 1.03 –1.11, p<0.001), District Schools (86%; IPR, 1.04; 95% CI 1.08 –1.16, p<0.001) and Private Schools (91%; IPR, 1.11; 95% CI 1.03 –1.11, p=0.002).

More than half (54%) of all schools had no sanatorium (Fig. 2). This comprised of 85% of District schools. About a quarter of the schools (23%) had no facilities set aside for nursing the sick or injured but 44% of the schools without sanatoria (Table 8) referred their injured to Health facilities outside the school compound while others handled the injuries in a staff room and laboratory.

A greater proportion of injuries occurring in the schools were referred to facilities outside the school (44%) as were attended at staff room (22%; IPR, 2.0; 95% CI 1.27 –3.20, p<0.001) Laboratory (9%; IPR, 4.89; 95% CI 2.5 –10.312, p<0.001) or not attended to at all (23%; IPR, 1.91; 95% CI 1.23 –3.03, p=0.003).

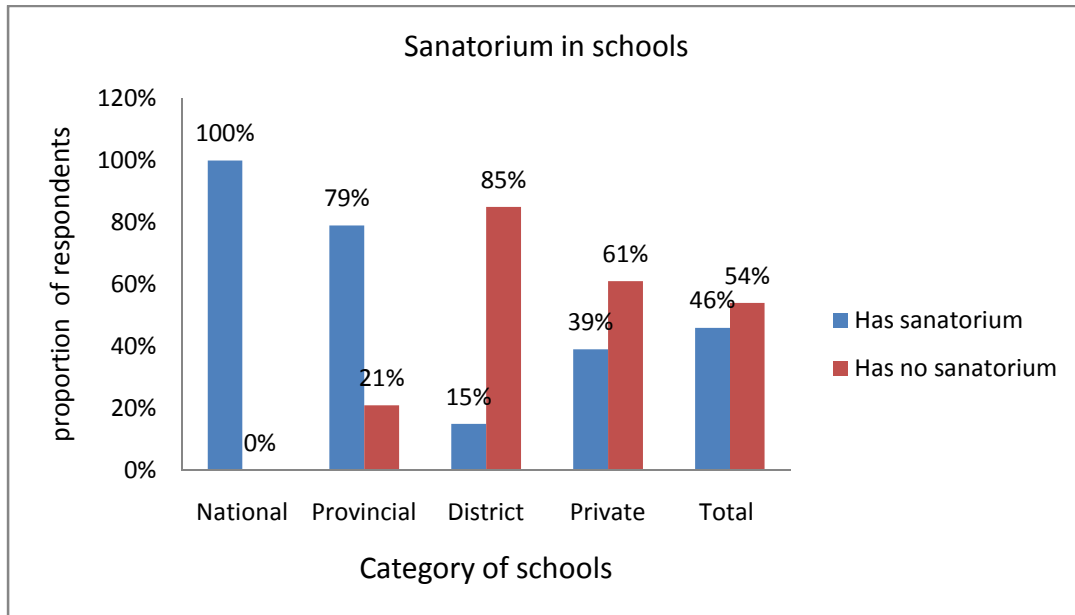


Fig. 2. Estimated number of schools with sanatorium

Table 8. Alternative health resorts for students in schools

School category	Health center	Staff room	laboratory	None	Total
Provincial	42%	11%	13%	37%	100%
District	60%	11%	7%	22%	100%
Private	44%	27%	13%	38%	100%
Total	44%	22%	9%	23%	100%

## 8. DISCUSSION

### 8.1 General Characteristics of Injuries among High School Students

Compared with many workplaces particularly those that undertake industrial processes, schools may be seen to be relatively safe. However, the cost of injuries is staggering both financially and in terms of human suffering injuries are quite frequent [14]. School management has a legal duty to anticipate that there should be accidents thus provide adequate response [10]. Adequate care to the injured students must be provided by the school management otherwise negligence in doing so may result to a breach of duty of care and hence a breach of tort [15].

### 8.2 Healthcare Givers in Schools

The study observed that there was a significant difference between the school category and the caregiver the school employed. A trained nurse in a school may call for the school to be prepared to meet her salary demands which might sometimes be more than what schools could financially afford or the salary may not be a priority of school expenditure. Therefore, the better financially established schools such as National schools would engage trained



nurses while schools with low budgets may look for cheaper or no alternatives at all. This concept is consistent with low health expenditures by Countries with low Income Level. In 2001 Low income countries spent on average US\$23 per capita while at the same time High Income countries spent US\$1856 per capita [16].

The prominence that a school gives towards healthcare giving would be the potential explanation that more than half of the schools had no trained caregivers. Caregivers in schools are individuals who may be called to work without supervision. It would be expedient that all were trained with special emphasis on First Aid as a basic life support service. In Kenya as in many countries, Voluntary Aid Societies provide training and publish manuals that guide First Aiders on how to give effective services [17]. A school without a health caregiver would expose itself to failure in duty of care for they do not produce competent caregiver as well as failing to take reasonable action towards those exposed to risks to health and safety hence negligence in Tort Law [18].

The Ministry of Education in Kenya through safety standards manual for Schools in Kenya [19] emphasizes that every school must have at least one adequately trained teacher on health of students. However, this study showed that this goal had not been met.

This study showed that 23% of the schools didn't have anyone to provide First Aid even when the schools meet for sport activities. Sport-related activities contribute to significant number of injury incidents in schools [20]. Prompt management and referral of injuries in schools would greatly improve the prognosis of an injury and reduce the overall cost of injury to the injured. The high risk of wounds becoming contaminated hence complications, such as bone and joint infections create significant problems for healthcare services if appropriate injury management is not given or if it is delayed [21]. The American College of surgeons showed that in every 10 deaths in all age groups after a trauma, 2 would have been prevented if there was optimal management [22].

### **8.3 First Aid Kit**

The study showed that 11% of the schools had no First Aid kit. Equipping a First Aid Kit and appointing persons to take charge calls for a school administration to have the will and the financial commitment. A suitable First Aid Kit in a school must have contents that fit the risks that are likely to be encountered in a school [23]. First-aid provisions must be available at all times while students are in school premises and also off the premises as when on school visits. It is not always a serious injury threat that proves to be a problem but neglect or inefficient treatment of an apparent trivial injury which may lead to infection, serious illness and even death [24]. Thus, a well-organized First Aid facility in a school or at any workplace minimizes accidents' severity, loss of work time and makes the victim get back to their activities with minimum time loss. Since the school administration has voluntarily taken students into custody, it should aspire to take reasonable action towards students at all times failure to which may form a basis for tort claims [25].

### **8.4 Schools and Sanatorium**

The study showed that more than half of the schools lacked a sanatorium. It is reasonable that nursing sick or injured student would require privacy and confidentiality which may be often provided in a sick bay [26]. A sanatorium helps in providing basic health care to students in a clean and safe environment as well as managing students' medical conditions in a clean and safe environment hence enabling the school programs to realize better output

[27]. Putting up and sustaining a sanatorium requires capital which occasionally is not within the school budgets. Involvement of parents to raise the required capital results in unmet targets. This may be the reason why some schools, particularly the less financially enabled District schools lacked the sanatoria. This observation is consistent with healthcare problems encountered in developing countries where socio-cultural, economic and political factors as well as poor planning and/or poor implementation of health policies and programs are major hindrances in development of healthcare facilities [28].

## **9. CONCLUSION**

Students in high schools are inevitably exposed to injuries in their environment. Schools embraced primary and secondary injury preventive measures but differences were significant among school categories. Our study would suggest that every school should formulate consistent safety management policies to address on post injury procedures [29] or as equivalent to Injury Management Systems at workplaces Work Cover WA [30]. The study showed that there were several ways in which school managements were exposed to breaching the law of tort yet there has been an increase in the general societal awareness of child rights even in developing countries. The consequences have been increase in legal litigation of parents and civil societies against school authorities. This makes school managers psychosocially and financially vulnerable. This study suggests that schools should undertake health and safety risk assessments among students in order to eliminate or reduce the potential or severity of possible lawsuits. Schools should consider engaging institutions that offer full insurance and risk management services to enhance insurance coverage as demanded by ever changing needs of schools as public and private institutions.

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The content of this article is solely the responsibility of authors.

## **COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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