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Epidemiology of Burns in Patients Aged 0 – 13 Years at a Paediatric Hospital in Kenya.

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Background: ***Burns are a common and significant cause of admission following injury in children.***
Methods: ***This was a retrospective hospital based multivariate survey conducted on burns patients aged 0 to 13 years over a five year period 2003 to 2007. It was conducted at a paediatric hospital in Nairobi, Kenya. During this period there were 1,052 patients admitted due to injury of which 202 (19.2%) had suffered a burns injury. Epidemiological data from the 202 patients was collected and analyzed.***
Results: ***The age range was 5 months to 13 years. The mean age was 3.4 years. 84.6% were in the age group 0 – 5 years. Males made up 59.7% giving a male to female ratio was 1.65:1. The main cause of burns was scalds with hot fluids accounting for 84.2%. Of the scalds, 175 (87.1%) took place at home. Unintentional burns accounted for the majority at 198 (98.5%).***
The majority of the patients [124, n= 176, 70.5%] had burns of Total Burnt Surface Area of less than 10%.
Conclusion: ***Our results were similar to other studies in literature especially from developing countries for burns in the paediatric age group. Prevention is the key.***

Key words: epidemiology, burns, paediatric, children, hospital

Introduction

Burns are a leading cause of unintentional injury in developing countries. They account for 9.1% of all unintentional injuries amongst individuals aged less than 20 years and are ranked 11th as a cause of unintentional injuries in individuals under 10 year olds.[1] In 2004 WHO estimated that 310,000 deaths were caused by burns, 30% of which occurred in individuals under 20 years.[2] Children are at a higher risk of death due to burns with estimated deaths of 3.9 for every 100,000 worldwide[1] . The rates in developing countries are higher with estimates of 0.4 per 100,000 in developed countries compared with 4.3 per 100,000 in developing countries .[1]

Open fire related burns account for 93%, scalds 5.4% and others at 1.6% . [1] The risk of fatality increases with decrease in age with a rate of 11 for every 100,000. [1] In developing countries the majority of patients admitted with burns are less than 5 years old.[3] In two studies done at Kenyatta National Hospital, burns accounted for 34.8% and 48.6% of injuries respectively.[3,4] Burns have been ranked as the second most common cause of accidental death in children younger than 5 years and the most common cause of accidental death in the home.[5]

The general lack of specialized burns care in developing countries results in much greater morbidity, disability, and mortality for burns victims.[6] Socio-economic factors such as illiteracy and rural to urban migration result in creation of slums with crowded living conditions. As a result of this there also tends to be a lack of adequate child supervision.[7]

Burn injuries have high morbidity with 8% suffering permanent morbidity, 17% suffering long term morbidity and 24% suffering a shorter period of morbidity according to the World Health Organization [1]

In Kenya, World Health Organization rated burns as the 4th leading cause of deaths due to unintentional injuries in individual's aged 0-14 years.[8]

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Patients and Methods

This was a retrospective hospital based survey covering a period of five years (2003 – 2007). After ethical approval data was extracted from hospital records of all patients aged 0 to 13 years who were admitted as a result of injury and entered into a structured questionnaire. This data was analyzed using SPSS version 17 computer software.

Results

Out of a total 4,576 patients admitted to the hospital in this period 1052(23%) were admitted as a result of injuries. Of these 202 were burns admissions in the age group 0 to 13years making 4.4% of total admissions and 19.2% of injury admissions.

The age range was 5 months to 13 years with a male to female ratio of 1.65:1 (Figure 1)

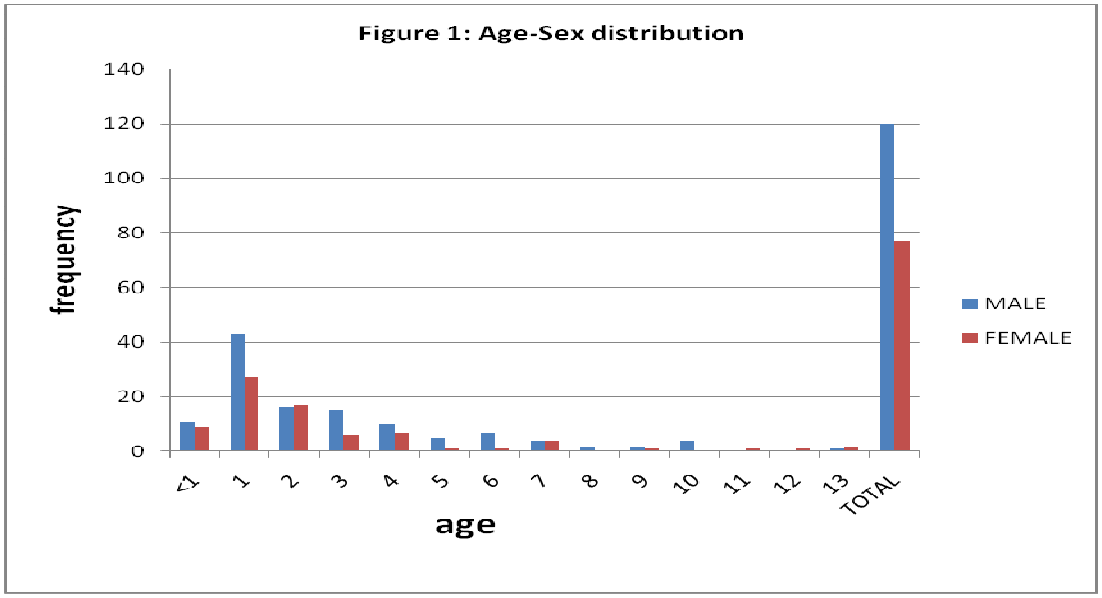

Table 1. Age-Sex Distribution

The mean age was 3.4 years with a mode and median of 3 years. There were 71 (35%) patients aged one year and 34 (17%) aged two years. Thus ages 1 and 2 years accounted for 52% of the total number of cases of burns. There were 170 (84.6%) patients in the age group 0 to 5 years. (Figure 1) All were unintentional burns. Two patients both of whom had suffered over 40% burns were transferred to another hospital for more specialized care. There were no mortalities.

We were able to ascertain the cause of the burns in 190 cases. Scalds with hot fluids accounted for the 170 (89.5%) of theses burns mostly hot water, tea, milk or porridge. There were 10 (5%) burns due to open fires, three due to electrical burns and two resulting from explosions (Table 1).

A total of 95.7% of burns were sustained in the home (Table 2). The upper limbs were involved in 45% of cases while 93 (46.8%) of the patients had multiple burn sites. The upper limb was the most frequently burnt region accounting for 111 of 356 (31.2%) with the arm accounting for almost half the cases of upper limb burns. The most frequently burnt areas were the arm, chest,

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thigh, leg, hand, face and neck in that order accounting for between 6.7 and 13.2% each respectively (Table 3)

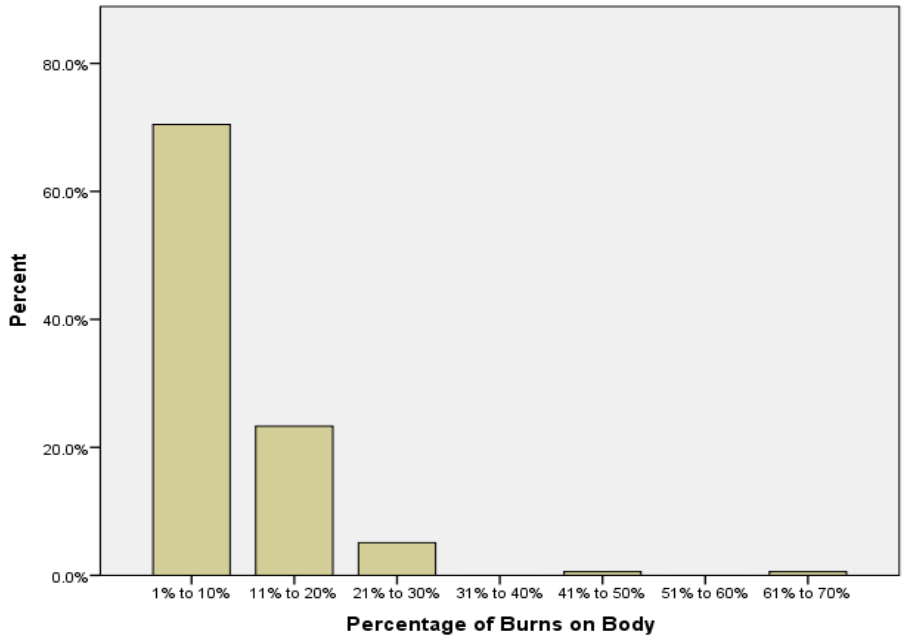

Figure 2. Total burnt surface area

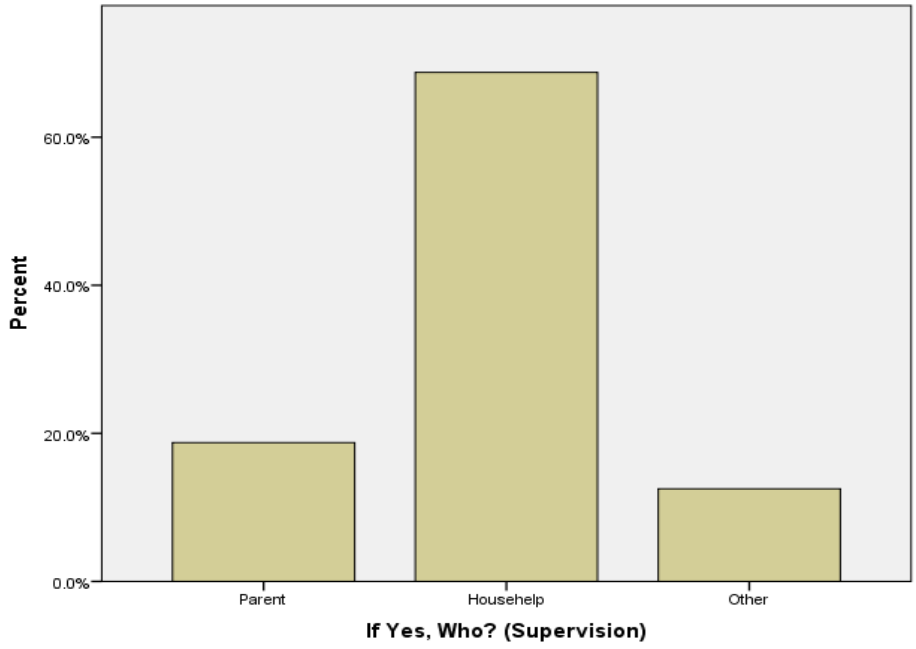

Figure 3. Individuals Supervisiong Burns Victim

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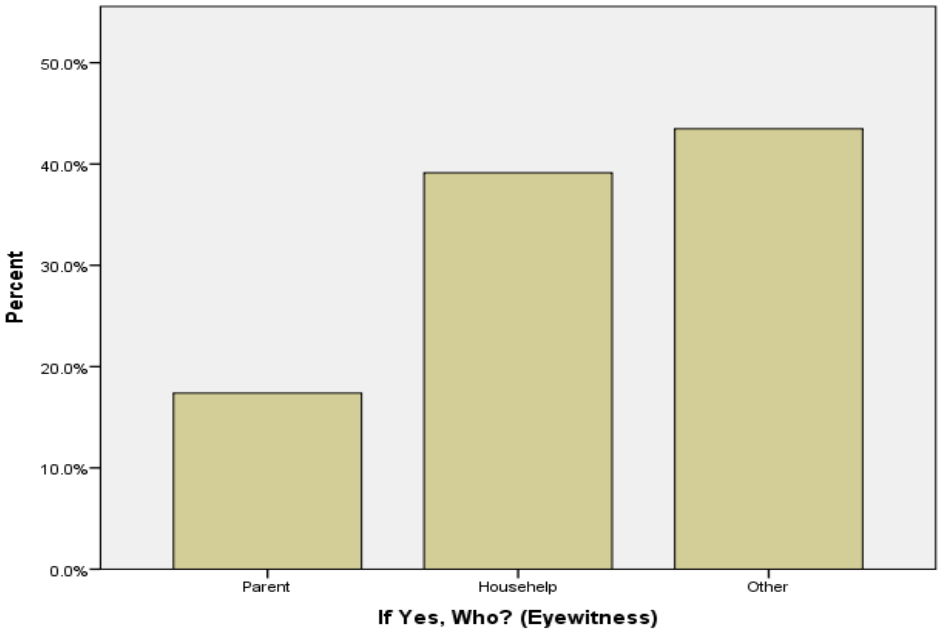

Figure 4. Eyewitness to burn event

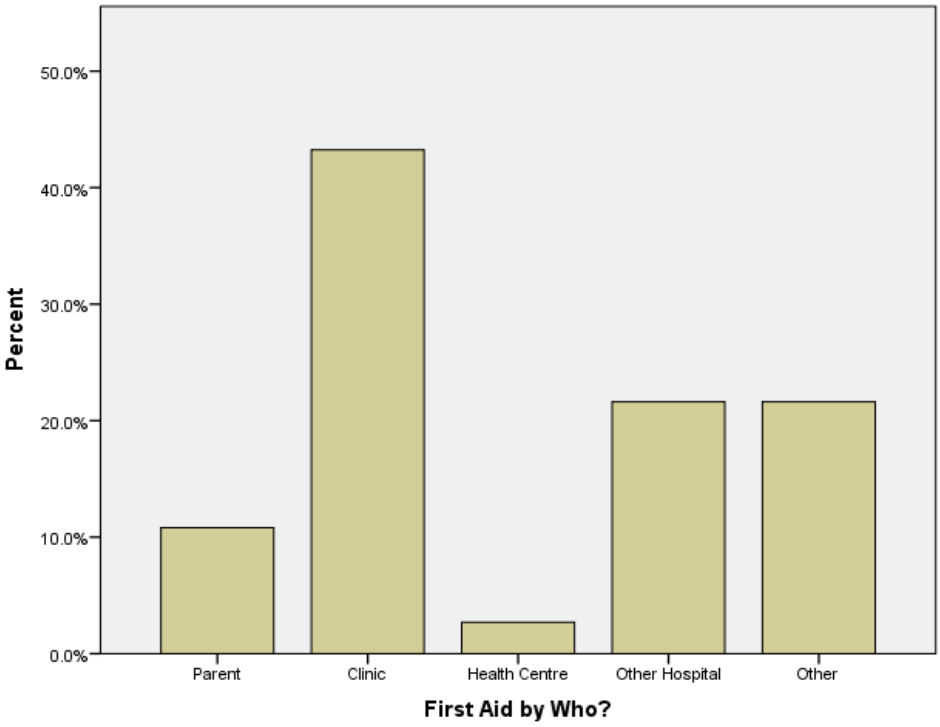

Figure 5. First Aid by Whom?

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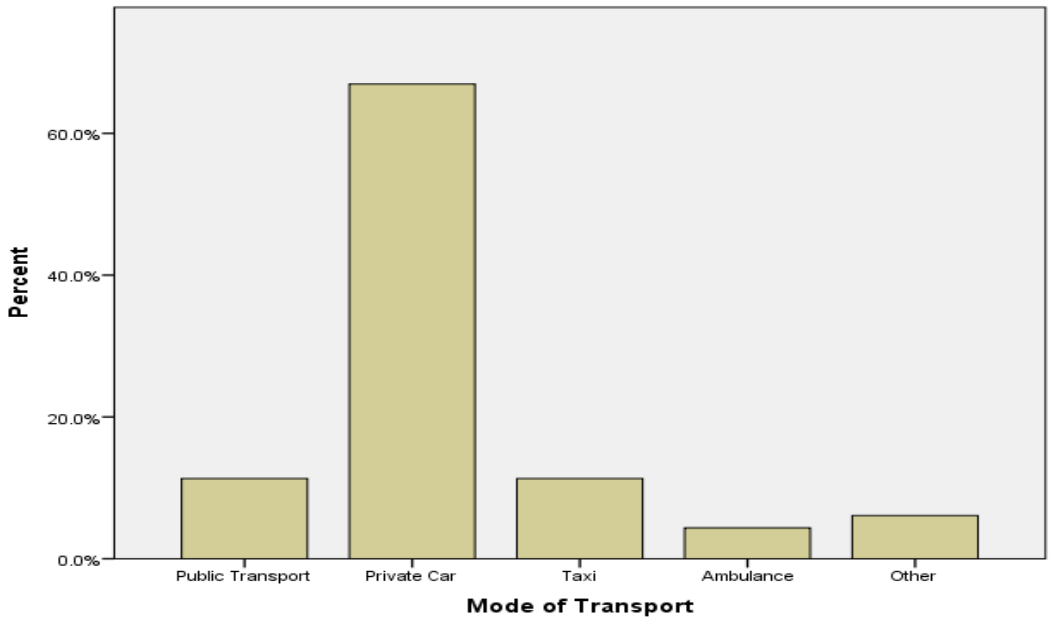

Figure 6. Mode of transport to hospital

Table 1. Causes of Burns

SCALDS		
	hot water	130
	Hot tea	29
	Hot soup	3
	Hot porridge	1
	Hot milk	4
	Hot food	1
	Hot oil	1
	Hot car radiator	1
	Sub total	**170**
FIRE		
	Open fire	1
	Burning garbage	1
	Candle flame	1
	Charcoal fire	6
	Stove	1
	Hot iron	2
	Sub total	**10**
EXPLOSIONS		
	Pressurized canister	1
	Electrical	1
	Sub total	**2**
ELECTRICAL BURN		**3**
UNKNOWN		**13**
	GRAND TOTAL	**202**

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Table 2. Place of Occurrence

Place Where Injury Occurred	Frequency	Percentage	Valid Percent
Home	175	87.1	95.6
Other	8	4.0	4.4
Total	183	91.0	100.0
Unknown	18	9.0	
Total	201	100.0	

Table 3. Location of burn

HEAD & NECK			***53***
	Ear	3	
	Face	24	
	Head	2	
	Neck	24	
CHEST & ABDOMEN			***62***
	Chest	45	
	Abdomen	17	
TRUNK			***26***
	Back	7	
	Perineum	3	
	Gluteal region	15	
	Groin	1	
LOWER LIMB			***104***
	unspecified	10	
	Thigh	34	
	Knee	4	
	Leg	34	
	Ankle	2	
	Foot	20	
UPPER LIMB			***111***
	unspecified	6	
	Shoulder	7	
	Axilla	1	
	Arm	47	
	Elbow	5	
	Forearm	12	
	Wrist	2	
	Hand	31	
TOTAL			**356**

***There were 93 cases of multiple site burns**

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Half (50%) of the burns had a Total Burnt Surface Area (TBSA) of between 5-15%. There were 124 (70.5% where n=176) cases of Total Burnt Surface Area (TBSA) 1 to 10%, whilst 41(23.3%) had TBSA` of 11 to 20% whilst 9(5.1%) had a TBSA of 21 to 30%. Only two cases (1.1%) had TBSA burns above 30% and both were transferred to a specialized burns unit at another hospital a short while after admission.

Regarding the local management of the burns in the 202 patients, 180 (89.1%) only had a saline wash and other conservative burns management procedures; 6 (3.0%) had surgical debridement in the operating room under a general anesthetic while 16 (7.9%) required skin grafting with or without prior escarotomy.

Eyewitnesses and Supervision

There were 158 responses indicating whether or not the child was under supervision and not surprisingly this correlated with the presence of an eyewitness to the event. Only 18(11.4%) were being supervised at the time of the burn of which 11(61%) were under the supervision of the house help/domestic worker, 3(16.7%) by a parent and the rest by some other individual. (Figure 3). It is clear that in most instances the child was unattended/unsupervised at the time of the burn event.

An eyewitness was present in 23 of 161 (13.9%) instances. Of these 23 instances 9(39.1%) were witnessed by the house help/domestic worker, 4 (17.4) by a parent and the rest by other persons such as relatives or neighbors (Figure 4)

First Aid and Mode of Transport

First aid was administered in only 39 (n=167) of the cases, however only 4 received first aid in the home - all by a parent, whilst the remainder of those who received first aid prior to arrival at the hospital, had it administered at a clinic or health centre (Figure 5). The majority of the children got to hospital using a private vehicle (77 of 115, 70%) whilst a taxi or public transport was utilized in 22.6% and an ambulance in only 4.3% (Figure 6).

Outcome

There was a good outcome in all who were admitted and remained in the hospital. The data on those who attended and were referred to a specialized burns unit without being admitted was not captured. Two of the admitted children were transferred out of the hospital and their fate is unknown. There were no recorded mortalities.

Discussion

.This study gives information on the epidemiological pattern of burns amongst paediatric patients admitted to hospital. Burns are a major cause of unintentional injuries to children particularly in developing countries. Burn injuries as a cause of childhood mortality as well as the impact on quality of life in terms of negative cosmetic and psychosocial effects make them a major public health concern.

The results of this study showed that burn injuries were largely unintentional and patients were aged between 0 and 5 years old with ages 1-3 accounting for the majority. This is in line with studies done in Nairobi,[3] Kampala[9], North Western Tanzania[10] and Nigeria[13]. A lack of awareness of potentially dangerous situations and substances amongst young children is a likely contributing cause. Inadequate supervision of young children as reflected by our results is probably also has a negative effect. The relatively low incidence of intentional burn injuries among children may not be a true representation of the actual situation as child abuse is largely

under reported due to fear of legal and social repercussions. Males were the most commonly affected gender, a finding in similar studies conducted in Rift Valley in Kenya, Kampala and Nigeria[8, 11, 12]. This can be attributed to their generally adventurous nature.

The most common place of occurrence of burn injuries was in the home, in accordance with studies done in other centers in developing countries [8, 9, 14]. This may indicate that a lower socioeconomic status reflects a lower standard of home safety.

In line with several studies,[8, 9, 14, 15, 17] scalds were the commonest cause of burns. They accounted for a larger percentage (90.4%) than that of these studies which ranged from 56.1%-70%; the results were however comparable to those of another study done in Kenya [11] in which scalds caused 90% of the burn injuries. The majority were due to hot water and hot tea similar to the findings of a study done in Istanbul [16] indicating a health and safety issue in cooking areas such as kitchens and further bringing emphasis to the need for improved supervision. First aid was recorded to have been done in a very small number of cases which points to a need for reinforcement of basic first aid administration amongst household members and other care givers in a bid to reduce morbidity caused by burn injuries.

A large percentage of the patients had relatively minor burns (<10% Total Body Surface Area) corresponding with the large percentage of patients who received only conservative treatment (89% n=202). Minor surgical intervention (surgical toilet) was required in 3% of the cases whilst 7.9% required skin grafts and escarotomies in addition to surgical debridement. These results were similar to those found in a study in North Western Tanzania [9] which included, in the major surgical procedures done, surgical management of associated injuries such as finger amputation. This however is in contrast to a study done in Bochum [18] where a larger percentage of patients underwent surgical procedures despite results showing a relatively similar pattern of TBSA involved.

Similar to another study done in Kenya [11], most patients had burn injuries involving multiple sites. The results showed that the most common sites were the upper and lower limbs. This was in contrast to the study done in Kenya [11] and other studies done in Pakistan [14] and Istanbul [16] in which the most common site involved was the upper limbs/hands and the trunk. In the Kenyan study the mechanism of injury is likely to be due to younger children or toddlers having a tendency to reach for objects on a table resulting in spillage onto the face trunk. And upper limbs.

The main mode of transport to the hospital was via a private car, public transport and taxi with a very small percentage using an ambulance. This is similar to findings in the Kampala [8] study pointing to a lack of adequate accident and emergency services within the region.
Our results showed no recorded mortalities. The outcomes of 3 cases was however unknown and may have resulted in fatality. Other studies generally showed a small percentage of deaths caused by burn injuries. [11, 12, 15]

Limitations

The study was subject to the usual limitations of a retrospective study. Data capture especially in the area of child supervision would have been elucidated further.

Conclusion

This study shows that childhood burn injuries are a challenging problem in our setting and a major cause of paediatric trauma. Children aged three years and below are commonly affected with a male predominance. Most of these injuries are unintentional; occur in the home setting

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with scald injuries comprising the majority. Although most of these injuries are relatively minor, they largely result in hospitalization which impacts the economy at individual, institutional and national level. Morbidity of burn injuries further extends into physical, social and psychological aspects of life due to their deleterious effects on function and cosmesis.
Prevention should be the primary area of focus. Based on the patterns of burn injuries shown by the results of this study, this may take the form of health and safety education to parents and other care givers with the aim of improving safety in the home environment as well as quality of child supervision. First aid administration is a necessary skill for all individuals to have and may reduce morbidity as well as enable appropriate and timely treatment of these patients.

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References

1. Peden M, Oyegbite K, Ozanne-Smith J, et al : *World report on child injury prevention.* Geneva: World Health Organization; 2008.
2. World Health Organization. *The global burden of disease: 2004 update.* Geneva: World Health Organization; 2008.
3. Gome DL, Mutiso VM, Kimende K: Paediatric trauma at Kenyatta National Hospital. East & Central African Journal of Surgery, 2005,10: 33-36
4. Ndiritu S, Ngumi ZW, Nyaim O : Burns: The epidemiological pattern, risk and safety awareness at Kenyatta National Hospital, Nairobi. East African Medical Journal, 2006, 83:455–460.
5. Harmel RP, Vane DW, King DR: Burn care in children: Special considerations. Clin Plast Surg 1986; 13:95-105.
6. Mock CN, Adzotor E, Denno D, *et al*. Admissions for injury at a rural hospital in Ghana: implications for prevention in the developing world. *Am J Public Health*1995;85:927–31
7. Oluwani JO: Burns in Western Nigeria. Br. J. Past Surg. 1996; 22(3); 216-23
8. World Health Organisation. *Department of measures and health education*. P 200a Table 1.
9. Mutto M, Lawoko S, Nansamba C, Ovuga E: Unintentional childhood injury patterns, odds, and outcomes in Kampala City: An analysis of surveillance data from the National Paediatric Emergency Unit. BMJ Injury prevention 3(1):13-8. 2011
10. Chalya PL, Mabula JB, Dass RM et al: Pattern of childhood burn injuries and their management outcome at Bugando Medical Centre in Northwestern Tanzania. *BMC Res Notes. 2011 Nov 9;4(1):485.*
11. Kidanu Estifanos Nega, Beernt Lindtjorn: Epidemiology of burn injuries in Mekele Town Northern Ethiopia: A community based study. Ethiop. J. Health Dev. 2002; 16 (1):1-7.
12. Oduor PR: Pediatric Burns at The Rift Valley Provincial General Hospital, Nakuru, Kenya. The Annals of African Surgery 2010, 5:
13. Okoro PE, Igwe PO, Ukachukwu AK: Childhood burns in south eastern Nigeria. Afr J Paediatr Surg. 2009 Jan-Jun;6(1):24-7.
14. Xin W, Yin Z, Qin Z, Jian L, Tanuseputro P et al: Characteristics of 1494 pediatric burn patients in Shanghai. Burns. 2006 Aug; 32(5):613-8.

ISSN 2073-9990 East Cent. Afr. J. surg

15. Iqbal T, Saaiq M : The burnt child: an epidemiological profile and outcome. J Coll Physicians Surg Pak. 2011 Nov;21(11):691-4.
16. M. Al-Shehri : The pattern of paediatric burn injuries in Southwestern, Saudi Arabia. WAJM Vol. 23 No. 4, October- December 2004.
17. Uygur F, Sahin C, Duman H: Analysis of pediatric burns in a tertiary burns center in Istanbul, Turkey. Eur J Pediatr Surg. 2009 Jun;19(3):174-8.
18. Holland AJ : Pediatric burns: the forgotten trauma of childhood. Can J Surg. 2006 Aug;49(4):272-7.
19. Langer S, Hilburg M, Drücke D et al : Analysis of burn treatment for children at Bochum University Hospital. Unfallchirurg. 2006 Oct;109(10):862-6.
20. Mock CN, Denno D, Adzotor ES : Paediatric trauma in the rural developing world: Low cost measures to improve outcome. Injury 1993, 24, (5), 291 - 296
21. Adesunkanmi AR et al : Epidemiology of childhood injury. J Trauma 1998 Mar 44(3); 506 - 512
22. Gediu E Accidental Injuries among children in Northwestern Ethiopia EAMJ 1994, 71: 807 – 810
23. Ademola AS : Childhood Injuries in Ilese South Western Nigeria