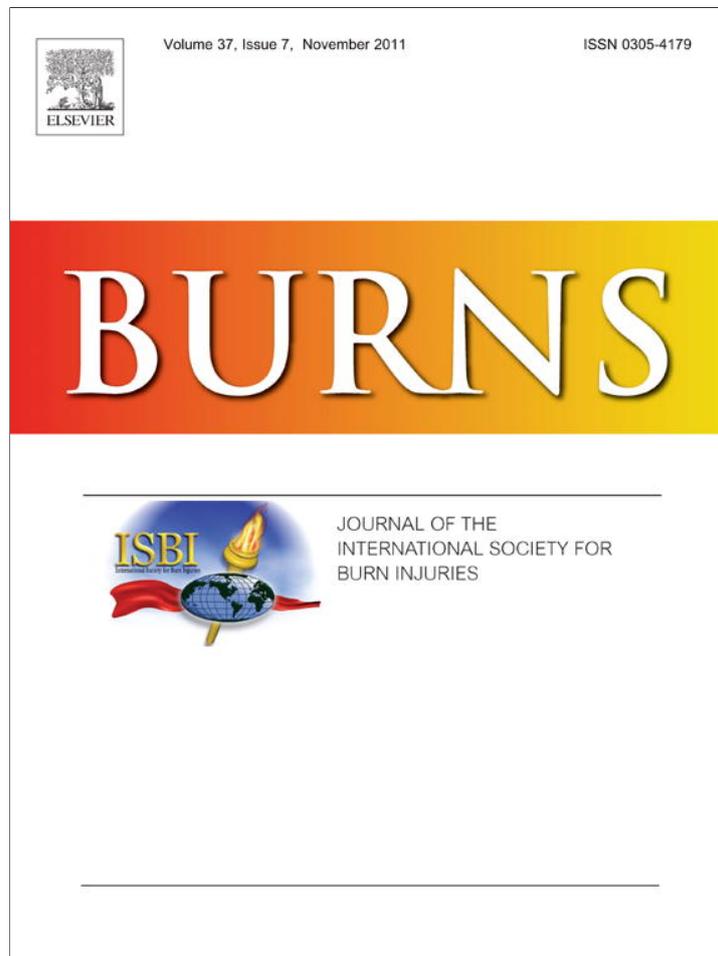


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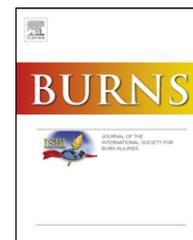


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Epidemiological study of burns in Komfo Anokye Teaching Hospital, 2006–2009

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ABSTRACT

Aim: To identify and describe the patterns of burns reported at the Komfo Anokye Teaching Hospital (KATH) from 2006 to 2009 and their outcomes on the various age groups and genders.

Methods: Patients' records from admission and discharge books of the Burns Intensive Care Unit, Polyclinic Casualty Consulting Rooms and from the Statistical Department of KATH were reviewed to obtain the necessary data for this retrospective study. Data entry and analysis were done by using SPSS version 17.0.

Results: A total of 731 patients' records were reviewed, with male to female ratio of 1.2:1. The mean age was 15.83 years; range was 0–79 years. Children less than 10 years were the most frequently admitted group (53.5%). Most of the burns occurred in domestic settings (88.5%), while, majority of the burns were accidental (98.8%). Scalds (57.4%) were the most frequent cause of burns followed by open flame (38.2%). The mortality rate was 13.1% for the period under review. Majority (71.4%) of the patients spent less than 10 days on admission. The mean total body surface area (TBSA) was 24.79%, and there was significant correlation between TBSA, age group, outcome and duration of hospital admission.

Conclusion: Children less than 10 years were the most vulnerable victims to burns; males dominated the number of victims. The commonest aetiological factor was scalds, with most of them related to inattention from parents. More dedicated burn surgeons and properly trained nurses are needed at KATH. Ambulance and pre-hospital services should be increased with adequate number of paramedics. Coordination between district hospitals and tertiary burn centres should also be established, for the proper transfer of burn cases to the tertiary burn centres, especially KATH.

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1. Introduction

Burns are among the common out-patient presentations in hospitals all over the world. Significant number of victims ends up in hospital admission. Most burns are minor and are treated by primary care. Many of the burns heal without any

complications but complete healing in terms of cosmetic outcome is often dependant on appropriate care, especially within a few days after the burn [1,2]. The incidence of burns vary greatly between cultures and occur in all age groups. There are approximately 1500 severe burns cases in Ghana each year, and a sizeable fraction of these burns occur in large-scale disasters caused by petrol-related fires [3–5]. However,

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such epidemiological information on burns in KATH, Kumasi is not adequate since there was no organized records/data on burns before the year 2001. It has been established that some burns are intentional and have criminal implications while others are unintentional, probably due to negligence [6]. Adults and children are affected as well as both genders [7,8]. Of late there have been recurrent burn disasters around and within the Kumasi metropolis which have claimed several lives.

Poor facilities and health structures are a common denominator in most parts of the developing world. In Ghana, most burn centres are situated in large cities and are insufficient for the high incidence of burns [9]. Regardless of inadequate physical structures, these centres are invariably plagued with lack of resources, lack of operating time and shortage of blood [3].

This retrospective study was purposely to identify and describe the patterns, aetiology and relation between extent of burns, demographic features, and hospital admission duration for admitted victims of burns reported at KATH, Kumasi, Ghana, between the years 2006 and 2009. The management of burns remains a challenge in developing countries. Few data exist to document the extent of the problem. This study provides data for documenting the epidemiology of burn and ascertaining the outcome of management. This will help in planning strategies for prevention of burns and reducing severity of complications; especially when Ghana has discovered oil in commercial quantity. Epidemiology of burns should be well studied to help improve the physicians' care for burned patients and enumerate the already challenges of burns management in KATH for appropriate measures to be taken.

2. Materials and methods

2.1. Study setting

The Komfo Anokye Teaching Hospital (KATH) in Kumasi is the second-largest hospital in Ghana and the only tertiary health institution in the middle belt of the country. It is the main referral hospital for the Ashanti, Brong Ahafo (BA), Northern, Upper East and Upper West Regions. Statistical records from KATH show that, about two-thirds of the patients are from the Ashanti region, with BA and the three Northern regions sharing the remaining in a two to one ratio.

The hospital was built in 1954 as the Kumasi Central Hospital. It was later named Komfo Anokye Hospital after Okomfo Anokye, a legendary fetish priest of the Ashantis. It was converted into a teaching hospital in 1975, affiliated to the School of Medical Sciences of the Kwame Nkrumah University of Science and Technology. The hospital currently has 1000 beds; up from the initial 500 when first built. Annually, the hospital attends to about 479,050 patients made up of both out- and in-patients (Biostatistics Unit, 2009).

2.2. Data collection

Ethical clearance for the study was obtained from the School of Medical Sciences/Komfo Anokye Teaching Hospital Ethics

Committee. The ethical concept of health delivery was observed and privacy and socio-cultural norms of patients was observed as much as possible. Data of burn patients were collected for the period of January 2006 to December 2009 from Burns Intensive Care Unit (BICU) of the Reconstructive Plastic Surgery and Burns Unit – from admission and discharge/death book – and also from the hospital statistical unit and Polyclinic Casualty consulting rooms over the period. Information retrieved for the study included: admissions' demographics, extent of burns, causes of burns, length of hospital stay (LOS) and mortality.

2.3. Data analysis

The quantitative data was analyzed using descriptive statistics, summarized and displayed on graphs and charts. Means of normally distributed variables were compared using the ANOVA and discrete variables analyzed using chi-square. Data entry and analysis was made using SPSS version 17.0 (SPSS, Inc., Chicago, IL, USA).

2.4. Limitations of the study

This study does not cover all the burned patients, especially patients who were treated in the Out Patient Department since some records could not be retrieved. Such patients were treated and discharged and the records at the Out Patient Department were not properly kept. Some patients were lost to follow up and so their data was not included. There are several hospitals in the city and in the region, therefore quite a number of burns were managed in these health facilities.

3. Results

3.1. Demographic features of patients

In this study, there were a total of 731 cases with the mean age of 15.83 years; the range was 0–79 years. Children under 10 years were the most frequently admitted group (53.5%), as shown in Fig. 1. Also, males dominated the burns as compared to female counterparts with 405 (55.4%) and 326 (44.6%) respectively.

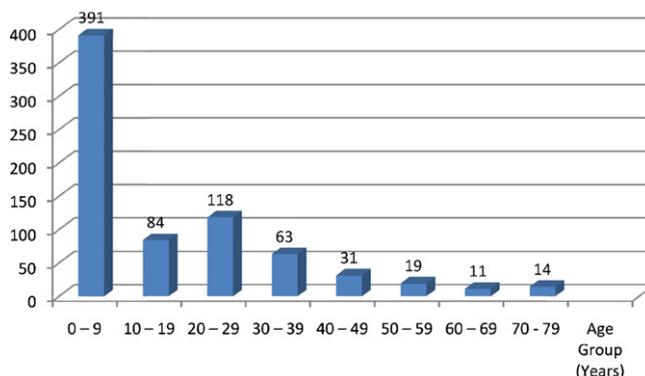


Fig. 1 – Age distribution of patients (n = 731).

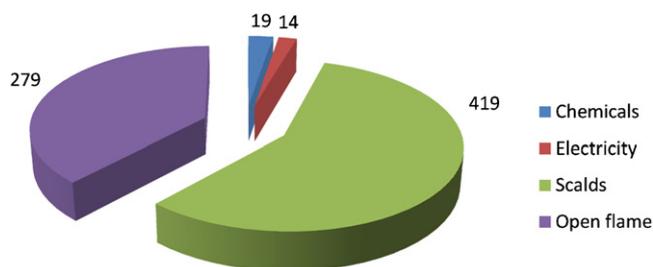


Fig. 2 – Aetiology/mechanism of burns (n = 731).

3.2. Characteristic of the Burns

The results of the study showed that majority of the burns were non-intentional (98.8%, n = 722) and few (1.2%, n = 9) intentional. In addition, scalds (hot water, hot soup and hot oil burns) were the most frequent cause of burns (57.4%) followed by open flame (38.2%). Open fire burns occurred from exposure to flames or gas explosion, petroleum and burning wood/bush/clothing. Other aetiological factors which made significant impact on burn cases were chemicals such as alkali (2.6%) and electricity (1.9%) in the descending order of frequency (Fig. 2).

The findings of the study again revealed that, most common place of occurrence of burns was home which accounted for 88.5% of the place of incidence. Significant number of cases occurred at workplaces (7.3%) and 2.5% cases occurred along the roads (highways) which were usually due to road traffic injuries. Other places of occurrence of burns over the 4 years period were the street, schools and farms (Fig. 3).

The year 2008 saw the highest incidence of 28.0%. The incidence rate increased gradually from 2006 to 2008 and reduced to 2009. There was marginal increase in 2008 due to burn disasters occurring in that year. A mortality rate of 13.1% was recorded for the years under review, with the year 2008 having the highest mortality due to various burn disasters in and around the city of Kumasi. Mortality increased from 2006 to 2008 and dropped from 2008 to 2009 (Fig. 4).

3.3. Clinical features of patients

Majority (71.4%) of the cases spent less than 10 days in the hospital followed by those who spent less than 20 days at the

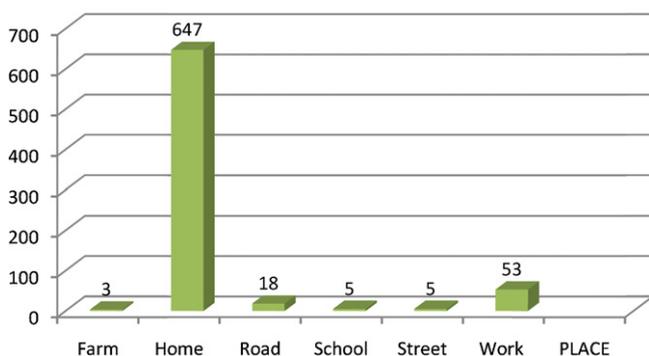


Fig. 3 – Places where patients sustained the burns (n = 731).

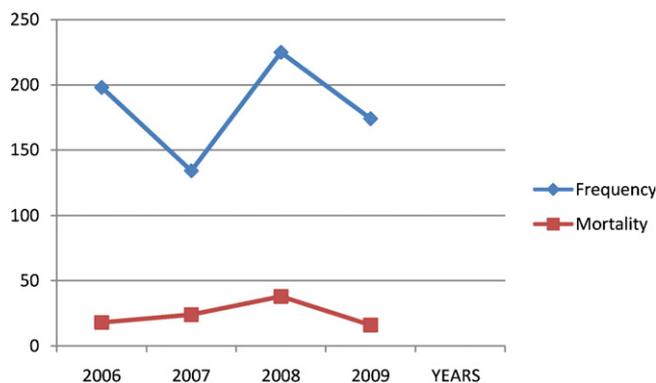


Fig. 4 – Distribution of burns and mortality over the years.

hospital (19.0%). Very few patients spent above 40 days in the hospital (Table 1).

There was a correlation between the total body surface area (TBSA) with the outcome of the burn as follows: There was high mortality associated with BSA burned more than 70%; almost all the burns with TBSA > 80% died; the outcome of patients with TBSA ≤ 30% was most favourable, with TBSA less than 10% and between 11% and 20% being the best outcomes respectively; there was direct proportionality increase in mortality (or worsening outcomes) as the TBSA increased from 30% upwards (Table 2).

Comparing the aetiology of burn to the outcome for the total mortality of 96, the results revealed that open flames burns had the highest mortality (68.8%) followed by scalds

Table 1 – Hospital duration of patients (n = 731).

Duration (days)	Frequency	Percent
≤10	522	71.4
11–20	139	19.0
21–30	41	5.6
31–40	19	2.6
41–50	4	0.5
51–60	2	0.3
≥60	4	0.5

Table 2 – Distribution of TBSA with the outcome of the burns.

TBSA	Outcome		Total
	Lived (%)	Died (%)	
≤10	152 (98.7)	2 (1.3)	154
11–20	245 (95.0)	13 (5.0)	258
21–30	144 (91.7)	13 (8.3)	157
31–40	58 (78.4)	16 (21.6)	74
41–50	19 (70.4)	8 (29.6)	27
51–60	8 (50.0)	8 (50.0)	16
61–70	6 (46.2)	7 (53.8)	13
71–80	3 (25.0)	9 (75.0)	12
81–90	0 (0.0)	10 (100.0)	10
91–100	0 (0.0)	10 (100.0)	10
Total	635 (86.9)	96 (13.1)	731

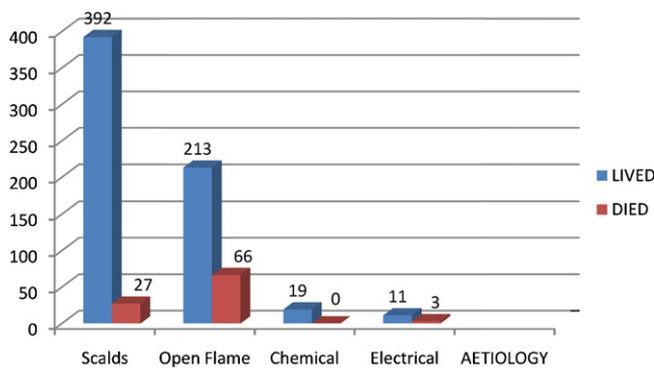


Fig. 5 – Distribution of aetiology of burns with outcome of the burn.

Table 3 – Correlation of TBSA and outcome of burns.

		TBSA	Outcome
TBSA	Pearson correlation	1	0.046**
	Sig. (2-tailed)		0.000
	n	731	731
Outcome	Pearson correlation	0.046**	1
	Sig. (2-tailed)	0.000	
	n	731	731

** Correlation is significant at the 0.05 level (2-tailed).

burns (28.1%). Electrical burns had lower mortality (3.1%), while chemical burns recorded no mortality (Fig. 5).

3.4. Pearson's correlation analysis

Pearson's correlation analysis for BSA/outcome was significant for $P = 0.046$ and the TBSA/Hospital duration was highly significant for $P = 0.016$. Correlation was significant at the 0.05 level (2-tailed) as shown in Tables 3 and 4.

4. Discussion

The results of this present study reveal novelties in terms of burns management, especially in most low- and middle-income countries, such as Ghana, where drastic burns survivals are rare [10]. In this study, a TBSA ≥ 80 recorded 100% mortality, while, similar studies from Nigeria, and India

reported that, TBSA ≥ 70 and 60 recorded 100% mortality respectively [11,12]. Also surprising is the mortality trend recorded in the study, it increases from 2006 to 2008, and decreased towards 2009. The discrepancy of the results of TBSA for 100% mortality and the reduction in mortality towards the last year of the study may be associated to the increased in number of burns surgeons, nurses and other personnel at KATH, advancement in the surgical techniques with an efficient treatment protocol coupled with early surgical interventions. These reduced the mortality as well the duration of admission by the burns survivors.

Age is an essential epidemiological determinant, and for our study, the findings revealed that, most (53.5%) of the patients were less than 10 years of age. Similar trend had been reported by Peck et al. [13] and Rajpura [14]. Also, males (55.4%) were involved in burns than females (44.6%). A similar scenario was found in studies conducted in Saudi Arabia [8,9], India [15], and Nigeria [16]. However, this finding differs from the study of Singh et al. in India [17]. The reason for males' involvement in burns more than females, especially in the younger age group (≤ 10 years) might be explained by the inquisitive and exploring nature of boys as compared to girls of this age. Furthermore, in Ghana, adult males generally have a significantly higher risk, since they are mostly engaged in driving, industrial and fuel related works.

The findings of this present study in terms of the aetiological factors of burns indicate that scald burns were the commonest types, followed by open flames, chemical and electrical burns. Scald burns had also been reported in many studies in different part of the world [2,9]. Aetiological factors are highly specific to each country, largely depending on the standard of living and lifestyle. Although open flame affected only 38.2% of our patients, they were found to be the most frequent aetiological factor of burns in reports from Egypt [18] and Nigeria [11,19]. The difference in ranking of different aetiological factors could be attributed to the developmental stage of the country, the age composition of the sample and whether outpatients were included or not.

The outcome- alive or dead- of the burns was an equal important factor in the study. This study recorded a mortality rate of 13.1%, with an increased trend from 2006 to 2008, and a reduction towards 2009. However, the number of burns cases decreased from 2006 to 2007, increased again to 2008 and then reduced to 2009. The study of Olaitan and Jiburum [11] and De-Souza et al. [20] also recorded similar trends where mortality decreased towards the last years. The change in mortality may be due to advancement in the surgical techniques, increased

Table 4 – Correlation of BSA and duration in hospital of burn victims.

		BSA	Duration in hospital (in days)
BSA	Pearson correlation	1	0.016**
	Sig. (2-tailed)		0.000
	n	731	731
Duration at hospital in days	Pearson correlation	0.016**	1
	Sig. (2-tailed)	0.000	
	n	731	731

** Correlation is significant at the 0.05 level (2-tailed).

number of plastic surgery medical personnel with an efficient treatment protocol. Early surgery strategy, has also aided in the reduction of days spent by patients in the hospital; the results showed that majority ($n = 522$, 71.4%) of the patients spent less than 10 days on admission. These findings from our study confirmed the study of Atiyeh et al. which reported that, early excision of burned skin reduced the risk of septicaemia, mortality, morbidity, hospital stay, and cost of treatment [21].

Statistical correlation (Pearson correlation) of TBSA burned and outcome (Survival/mortality) in this present study, demonstrated a positive significance level ($P = 0.05$). This implies that, TBSA burned of the patients influences the chances of survival of the burned victim; hence, the greater the extent of the burns, the lower the likelihood of the victim to survive. O'Sullivan and Schmitz reported in their study that, TBSA is the major risk factor predicting the outcome of burns [22]. This is consistent with the study of De Souza et al. (1998) from Brazil which shows increased mortality depends on the high level of TBSA burnt [20]. Olaitan and Jiburum also reported similar correlation in their study in Nigeria [11]. Another highly associated significant level in the study was found between TBSA burned and duration of hospital admission ($P = 0.02$). The result reveals that, TBSA burned patients plays a major role in the patients stay in the hospital during admission.

Ramakrishnan and Jayaraman reported that, lack of well-trained and motivated burns surgeons can worsen the burns mortality situation in developing countries as well [23]. To keep alleviating the mortality rate of burns patients in KATH, proper research and coordination of district, regional and tertiary burn care centres should be established. The existing burns unit at KATH in Kumasi and other referral centres for burn patients should be expanded to cater for more cases at a time. To solve the shortage of burns specialized personnel in KATH, more young health professionals should be encouraged to opt for burns programs during specialization, which has to be supported by grants from the appropriate government unit. There should be an increase in the number of plastic surgery nurses and other paramedics, by introducing burns management and plastic surgery courses in the KATH burns unit. Resuscitation equipment should be provided at the district hospitals to avoid complications before referring the burn victims to KATH. More bases for emergency services vehicles should be provided at all levels of health care.

5. Conclusion

Children less than 10 years were the most vulnerable victims of burns, while, males dominated the number of burns victims. The commonest aetiological factor was found to be scald burns. Most of the burns were due to lack of parental monitoring. More dedicated burn surgeons, properly trained nurses and paramedics are needed at KATH to help reduce the burns mortality. Ambulance and pre-hospital services should be increased with adequate number of paramedics. Coordination between district hospitals and tertiary burn centres should also be established, for the proper transfer of burn cases to the tertiary burn centres, especially KATH.

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Conflict of interest

The authors have no conflict of interest.

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