



Contents lists available at ScienceDirect

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## Burns in the middle belt of Ghana: A systematic review

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### ARTICLE INFO

#### Article history:

Received 11 December 2017

Received in revised form 6 February 2018

Accepted 8 February 2018

Available online xxx

#### Keywords:

Burns

Middle belt of Ghana

Epidemiology

Systematic review

### ABSTRACT

**Background:** Burns are a major global public health issue affecting persons of all ages. Various studies have indicated that developing countries share a greater burden of the injury. Despite this fact, Ghana as a developing country lacks a burn repository and that makes it difficult to clearly understand the bigger picture of the injury. To this end, this study aimed to systematically review primary studies of burn occurrence in the country.

**Methodology:** A comprehensive literature search was undertaken using PubMed, ScienceDirect, Google Scholar, MEDLINE and EMBASE. The keywords used were “burns, epidemiology, Ghana, injury, flame burn, scald burn, electric burn, chemical burn, contact burn and explosion”. Additional articles were identified by reviewing reference lists. The local journals such as the Postgraduate Medical Journal of Ghana were searched for the articles not indexed in PubMed or EMBASE. MOOSE guidelines were followed in executing this review. At the end of the selection process, seven papers remained and included in the study.

**Findings:** Findings from this review identified that more males than females were involved in burn injuries. Persons within the paediatric age group (particularly those under 10 years of age) were particularly susceptible to burns. This notwithstanding it was noted that there is an increasing occurrence of burns among persons in the working class group (15 years–59 years). Scald was the most common injury among the paediatric age group whilst flame burn was most common among the adult population. The home was noted to be the commonest place for burn occurrence though some disasters at fuel filling stations were recorded. The occurrence of burn was associated with various burned surface area and from the studies reviewed it was noted that higher total burned surface area (TBSA) may be linked to increasing mortality rates. Length of hospitalisation ranged from less than 10 days to 760 days. Epilepsy was reported by one study as a pre-morbid condition.

**Conclusion:** Burns represent a significant public health problem in Ghana and there is a need for the design of more effective intervention to reduce the occurrence of the injury. A larger scale research is imperative to investigate burns epidemiology from a national perspective.

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### 1. Introduction

Burn injuries represent a major cause of morbidity and mortality throughout the world and its occurrence is not specific to any age group or population [1]. Burn injuries perhaps represent the widest range of any form of trauma [2]. Burn injuries may range in severity from very minor requiring no treatment to extremely severe requiring highest level of intensive treatment [2]. The burden of burn is unevenly distributed throughout the world and the majority of burns associated deaths occur in low- and middle-income countries (LMIC) [2]. Though the incidence of burn

injury has been noted to be decreasing in the Western Countries, the rate of reduction has been indicated to be slower than other illnesses [3,4] and its burden remains high in African WHO regions which specify the need for public health interventions [5].

Burn injuries of varying degrees are common in Ghana as reported by various individual studies in some parts of the country. Despite this fact, the country lacks a National Burn Repository which makes it difficult to assess the actual epidemiology and outcomes of the injury [6]. The burden of burn injuries and lack of adequate epidemiological data makes it challenging for the policy makers to implement a proper strategic plan for burn prevention. High income countries are able to reduce the burn incidence and mortality through proper epidemiological research and utilizing the information for planning preventive strategies [2]. However,

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different strategic planning is required based on the unique context of a particular country. The programs which are successful in developed countries might not be translated in developing countries due to some unique differences such as demographics among others. Thus, this review aims to identify the demographics, mechanism of injury, associated risk factors, and outcome of burn injury in the middle belt of Ghana. As this is the first form of systematic review utilising various primary studies across the country, the findings will be useful for policy makers and clinicians regarding having a broader understanding of the characteristics of burns in Ghana. Also, findings can aid the design of context specific preventive strategies in the country.

## 2. Materials and methods

This review aimed to include all studies from January 1990 to August 2017 reporting on aetiology, incidence and outcome of burn injuries among persons in Ghana. The MOOSE guidelines were followed in this review [7]. A comprehensive literature search was undertaken using PubMed, ScienceDirect, Google Scholar, MEDLINE and EMBASE. The keywords used were “burns, epidemiology, Ghana, injury, flame burn, scald burn, electric burn, chemical burn, contact burn and explosion”. Additional articles were identified by reviewing reference lists. The local journals such as the Postgraduate Medical Journal of Ghana were searched for the articles not indexed in PubMed or EMBASE. The inclusion criteria for the article were (1) articles which studied epidemiological characteristics of burn injury in Ghana, (2) only published articles or hospital based reports were included in the review, and (3) only studies reported in English Language. Articles were excluded if they fail to present the data for extraction, and also, case studies, editorials and brief commentaries were not included in this review. The data were extracted from each study into an excel spread sheet and further evaluation were done by the authors. The formal meta-analysis was not performed due to the large degree of heterogeneity between the various studies. The initial search produced 129 articles. The process of article selection for the review is summarised in Fig. 1 below:

## 3. Results

The electronic database search resulted in 129 articles, out of which 7 were selected for inclusion in this review (Table 1).

### 3.1. Demographic features and incidence of burns

Among the studies included in this review, six studies reported more males been involved in burn injuries as shown in table one above. In addition to this, six of the studies utilised data from the Komfo Anokye Teaching Hospital, which serves as a referral facility for the Northern and middle belts of Ghana. Thus, the data represents burned patients from other regions of Ghana. However, the study by Forjuoh [8] was undertaken within the confines of the Ashanti region of the Republic of Ghana. Agbenorku et al. [9] also reported on burn disasters that occurred in the middle belt of Ghana from 2007 to 2008.

Burn injuries were noted to be prevalent within the paediatric age group. For instance, from 2006 to 2009, Agbenorku et al. [10] reported that children under the age of ten (10) years formed 391 (53.5%) of the total 731 persons admitted with burns. From 2009 to 2013, Agbenorku et al. [12] observed that persons under the age of ten years (10) were 237 (48.7%) of the total 487 persons admitted with burn injuries at the Komfo Anokye Teaching Hospital (KATH). More recently, Agbenorku et al. [14] has indicated that between 2009 and 2016, children within the age limits of 0–9

years were up to 297 (43.5%) of the total 681 patients admitted with burns. Though the data presented by Agbenorku and colleagues may be limited to only admitted burned patients, the findings of Adu & Koranteng [11] provides support for the assertion that burns is more prevalent among children under 10 years. This is because they noted that from 2003 to 2012, data obtained from the Burn Intensive Care Unit (BICU), theatre and Surgical Outpatient Department of KATH indicated that persons under the age of ten (10) years formed 45% (612) of the total 1361 persons admitted or seen with burns. Despite these, Agbenorku et al. [9] noted in their study regarding burn disasters within the middle belt of Ghana that children under the age of ten years were 2 (4.3%) of the total number of 46 victims involved in the injuries who were admitted.

Aside the paediatric group, five studies reported increasing occurrence of burn injuries among persons within the working class aged 15–59 years [9,10,12–14]. Varying median and mean ages were reported by some studies: Agbenorku et al. [14] reported mean and median ages of 19.1 and 17 respectively. In similar lines, Adu and Koranteng [11] also reported median and mean ages of 11.9 years and 15.5 years respectively. Further to these, three (3) studies also reported the occurrence of burns among older persons aged 60 years and above [10,11,14].

Additionally, two studies reported on the employment status of the persons who were admitted with burn injuries. Agbenorku et al. [14] noted that 41% (279) of the burned patients were in various forms of employment whilst 12% (82) were unemployed. They further noted that majority (37%) of the burned patients were engaged in blue collar jobs as drivers, mates, cooks, farmers, electricians and fuel station attendants whilst 4% were engaged in white collar jobs. Bayuo et al. [13] also noted that artisans and farmers formed 60% (60) of the total 100 participants in their study.

### 3.2. Aetiology and mechanism of injury

As shown in Table 2, burn injuries in Ghana appear to have varied aetiological factors. Aside the study by Agbenorku et al. [9] which was solely due to petrol tanker explosions, all other studies reported varied causes of the injury. Hot liquids such as soups and oil were reported by five studies as the most common cause of burns in Ghana. Within the paediatric age group, scald injuries clearly dominate as noted from the studies included in this review. However among other age groups, open flames resulting from various causes such as gas explosion clearly dominate. Despite this, burns resulting from electrical and chemical sources were reported by five studies. In addition, two studies reported the occurrence of burns from unknown causes. Contact burn was also reported by one study as existing within the paediatric population [8].

### 3.3. Place of burn injury occurrence

Most common place of burns was identified to be the domestic setting (house) according to the studies which reported the place of burn incident. However according to the study by Agbenorku et al. [9], one episode of the burn disaster occurred at the fuel filling station whilst three explosions occurred by the road side when the petrol tankers overturned leading to discharge of their contents. Three studies also reported the occurrence of burn injuries at the work places as well.

### 3.4. Severity of the injury

Six studies reported varying total burned surface area (TBSA) as resulting from the injury. From 2006 to 2009, Agbenorku et al. [10] reported TBSA ranging from 10% to 100% (mean TBSA noted as

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