



**PREVALENCE AND ASSOCIATED FACTORS OF BURN INJURY AMONG  
PRIMARY SCHOOL CHILDREN IN SENTUL, KUALA LUMPUR, MALAYSIA**

By

**ANUSOOYA A/P DEMADO**

**Thesis Submitted to the School of Graduate Studies, Universiti Putra  
Malaysia, in Fulfilment of the Requirements for the Degree of  
Master of Science**

**December 2022**

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in  
fulfilment of the requirement for the degree of Master of Science

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**December 2022**

**Chairman : Professor Kulanthayan a/I K.C. Mani, PhD**  
**Faculty : Medicine and Health Sciences**

Introduction: Burns are the fifth most common cause of non-fatal childhood injuries. Burns among children may not only cause life-long disability, but also affect the mental health and quality of life of their families, imposing a socioeconomic burden. There is limited availability of existing literature on home fires and burns among minors, traffic accidents and work-related injuries in Malaysia (Peck, 2011). In 2017, heat-related events caused more than 120 000 fatalities and close to 9 million injuries globally. Moreover, based on a report by Safe Kids, Universiti Putra Malaysia (UPM) highlighted that a child dies due to fire or burns very two weeks and 6.4% of parents said that they had experienced a fire at home in the previous two years (Kulanthayan et. al, 2016). The aim of this study is to measure prevalence of fire and burn related injuries at home and its associated factors. Hence, the development of preventive measures like training the communities in basic first aid and educating susceptible groups can greatly decrease the frequency and intensity of burn injuries since fire and burn accidents are largely preventable and it is necessary to evaluate parents' and kids' knowledge and consciousness.

Objective: To explore the prevalence of burn injury and its associated factors among primary school children ages 7 to 11 years in Sentul, Kuala Lumpur.

Methodology: Cross sectional study design was used to investigate the association between contributing factors and knowledge with prevalence of burn injury among 260 students ages 7 to 11 years and their respective parents from the government primary level schools in Sentul, Kuala Lumpur. The sampling method used for this study for the selection of schools was the probability sampling proportionate to size and for student sample selection was stratified random

sampling. Validated and self-administered questionnaires was used for students and parents for data collection. All the data was analyzed using SPSS.

Results: A total of 220 students participated in this study with response rate of 84.6%. Followed by the socio-demographic characteristics, 52% were male and the highest percentage of students (25%) were 8 years old. The majority were Malay students (56%). The majority of the students' parents (31%) household income is RM1001 to 3000. The result shows that 31.8% had burn injury for the past one year. Out of 31.8% of burn injury incident, 18.2% caused by hot kitchen appliances/drinks/foods. The children had high knowledge on factors causing fire, burn and scald injury (65.9%), yet had low knowledge on first aid (84.5%) and fire response mechanism (74.5%). The parents had high knowledge on first aid for burns (53.4%) and fire response mechanism (60.9%). Multiple logistic regression analysis revealed that child living in apartment/flat/condominium types of houses were 2.504 times more likely to have burn injury compared to Terrace/Low-cost/Wood. Children with low knowledge on factors causing fire, burn and scald injury have increased odds of burn injury by 1.112 times (AOR = 1.112, 95% CI = 1.020-2.342,  $p = 0.028$ ). Parents with low knowledge on first aid for burns tripled the odds of burn injuries among children (AOR = 3.223, 95% CI = 1.234-4.567,  $p < 0.001$ ). Parents with low knowledge on burn preventive measures fire response mechanism have doubled the odds of burn injuries among children (AOR = 2.556, 95% CI = 1.642-4.882,  $p = 0.021$ ).

Conclusion: Despite having acceptable knowledge of burn injury factors, the children lacked knowledge of burn first aid care and fire response mechanism. It is possible that this is due to a lack of awareness programs and inadequate burn first aid management and fire response mechanism education in the school curriculum. The use of various methods of education to teach about the key principles of burn first aid management and fire response mechanism may be expanded upon in school topics. To raise parental knowledge of burn hazards, educational programs targeted at detecting and avoiding the causes of burn injuries are critical, particularly for those who live in apartments, flats, or condominiums. Governmental and non-governmental organizations should make much greater efforts to increase awareness among the parents and to reduce the prevalence of burn injury.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia  
sebagai memenuhi keperluan untuk ijazah Master Sains

**PREVALEN DAN FAKTOR-FAKTOR YANG BERKAITAN DENGAN  
KECEDERAAN KEBAKARAN DI KALANGAN PELAJAR SEKOLAH  
RENDAH DI SENTUL, KUALA LUMPUR, MALAYSIA**

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**Disember 2022**

**Pengerusi : Profesor Kulanthayan a/l K.C. Mani, PhD**  
**Fakulti : Perubatan dan Sains Kesihatan**

Pengenalan: Kelecuman adalah punca kelima paling biasa bagi kecederaan kanak-kanak yang tidak membawa maut. Kelecuman dalam kalangan kanak-kanak mungkin bukan sahaja menyebabkan hilang upaya sepanjang hayat, tetapi juga menjejaskan kesihatan mental dan kualiti hidup keluarga mereka sehingga membebankan sosioekonomi.

Objektif: Bagi mengetahui prevalens kecederaan melecur dan factor-faktor yang berkaitan dengannya dalam kalangan kanak-kanak sekolah rendah berumur 7 hingga 11 tahun di Sentul, Kuala Lumpur.

Kaedah: Reka bentuk kajian keratan rentas digunakan untuk menyiasat perkaitan antara faktor penyumbang dan pengetahuan dengan prevalens kecederaan melecur dalam kalangan pelajar berumur 7 hingga 11 tahun di sekolah peringkat rendah kerajaan di Sentul, Kuala Lumpur. Soal selidik yang disahkan dan ditadbir sendiri telah digunakan untuk pelajar dan ibu bapa untuk pengumpulan data.

Keputusan: Keputusan menunjukkan bahawa 31.8% mengalami kecederaan melecur. Daripada 31.8% insiden kecederaan kebakaran, 18.2% disebabkan oleh peralatan dapur/minuman/makanan panas. Kanak-kanak mempunyai pengetahuan yang baik tentang faktor-faktor yang menyebabkan kebakaran, melecur dan kecederaan melecur (65.9%), namun mempunyai pengetahuan yang lemah tentang pertolongan cemas (84.5%), dan mekanisme tindak balas kebakaran (74.5%). Ibu bapa mempunyai pengetahuan yang baik tentang pertolongan cemas untuk kelecuman (53.4%) dan mekanisme tindak balas kebakaran (60.9%). Analisis regresi logistik berganda mendedahkan bahawa

kanak-kanak yang tinggal di pangsapuri, rumah pangsa atau kondominium meningkatkan kebarangkalian kecederaan kebakaran. Kanak-kanak yang mempunyai pengetahuan yang rendah terhadap faktor-faktor kebakaran meningkatkan kecederaan kebakaran sebanyak 1.112 kali (AOR = 1.112, 95% CI = 1.020-2.342,  $p = 0.028$ ). Ibu bapa yang kurang pengetahuan tentang pertolongan cemas untuk melecur meningkatkan tiga kali ganda kemungkinan kecederaan melecur di kalangan kanak-kanak (AOR = 3.223, 95% CI = 1.234-4.567,  $p < 0.001$ ). Ibu bapa yang kurang pengetahuan tentang langkah-langkah pencegahan kebakaran dan mekanisme tindak balas kebakaran telah menggandakan kemungkinan kecederaan terbakar di kalangan kanak-kanak (AOR = 2.556, 95% CI = 1.642-4.882,  $p = 0.021$ ).

Kesimpulan: Walaupun mempunyai pengetahuan yang boleh diterima tentang faktor kecederaan terbakar, kanak-kanak tersebut kurang pengetahuan tentang pertolongan cemas kelecuman dan mekanisme tindak balas kebakaran. Ada kemungkinan ini disebabkan oleh kekurangan program kesedaran dan pengurusan pertolongan cemas kebakaran di sekolah. Penggunaan pelbagai kaedah pendidikan untuk mengajar tentang prinsip utama pengurusan pertolongan cemas kebakaran boleh diperluaskan dalam topik sekolah. Untuk meningkatkan pengetahuan ibu bapa tentang bahaya luka kebakaran, program pendidikan yang disasarkan untuk mengesan dan mengelakkan punca kecederaan kebakaran dan kelecuman adalah kritikal, terutamanya bagi mereka yang tinggal di pangsapuri, rumah pangsa atau kondominium. Pertubuhan kerajaan dan bukan kerajaan harus melakukan usaha yang lebih besar untuk meningkatkan kesedaran di kalangan ibu bapa serta untuk mengurangkan kelaziman kecederaan terbakar.

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This thesis was submitted to the Senate of the Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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## LIST OF ABBREVIATIONS

AOR	Adjusted Odd Ratio
CI	Confidence Interval
OR	Odds Ratio
MOE	Ministry of Education
MOH	Ministry of Health
SFI	School-Family-Individual
SK	Sekolah Kebangsaaan
SJKT	Sekolah Jenis Kebangsaaan Tamil
SJKC	Sekolah Jenis Kebangsaaan Cina
UPSR	Ujian Pencapaian Sekolah Rendah
WHO	World Health Organization

## CHAPTER 1

### INTRODUCTION

This chapter introduces the landscape of the study and line the current situation in burn injuries among children. The problems and issues that need to be address was highlighted with supporting evidence in problem statement section. Based on the problem statements, several research questions were deduced. Research objectives and respective hypotheses were stated. The important variables of study were defined in this chapter.

#### 1.1 Background

The Millennium Developmental Goals document the remarkable achievements towards a 50% reduction in deaths for under-fives since 1990 due to interventions focused on targeting infectious and communicable diseases and improving access to essential child health services. (Global Burden of Disease Study 2019).

Child injuries contribute to a high share of non-communicable diseases in children, but they have received limited attention in spite of their preventability (Alonge and Hyder, 2014; Byass et al., 2013; Shiffman & Shawar, 2020). Child injury is a worldwide problem. Daily, in the world the lives of more than 2000 families are torn apart by the loss of a child to accidents that are also known as unintentional injuries. Examples of unintentional injuries include road traffic, drowning, burns, falls as well as poisonings (WHO, 2020). Injuries as a whole and burns in particular are, in fact, major causes of both death and social inequalities in child health (Jeschke et al., 2020).

Fire and burn injury are the injury to the skin or other organic tissue primarily caused by thermal or other acute trauma (Peck, 2011). Burn injuries represent a significant economic health care burden leading to an estimated 265,000 deaths worldwide per year. Worldwide, there were 8,991,468 new injuries from fire, heat, and hot substances in 2017, of which 120,632 resulted in death (Global Burden of Disease Study, 2017). Mortality rates remains high (10–20%) even in well-equipped burn centers. According to the World Health Organization (WHO), majority of burn fatalities originated from developing nations in Southeast Asia region with a prevalence of 1.3 burn patients in every 100,000 populations (Sethuraman et al., 2021). In developed countries, burn injuries account for more than 50,000 admissions with a mortality rate of 5–6% (Suman & Owen, 2020). Similarly, an annual report by the Malaysian Ministry of Health 2016 reported that traumatic burn injuries being the 5th highest leading cause of hospitalization within the Ministry of Health (MOH, 2016). According to Global Burden of Disease Study in 2017, in Malaysia, 3.6% of heat-related injuries resulted in death (Peden, 2018).

Studies showed that younger population were more prone to burn injuries in developing nations. In many high-income countries, burn death rates have been decreasing, and the rate of child deaths from burns is currently over 7 times higher in low- and middle-income countries than in high-income countries (Peden, 2018). This is a growing concern for developing nations as the younger population represents most vulnerable population and they will be the majority of the workforce that drives the local economy in future. Pediatric burns rank similarly to adult burns with regards to incidence. Almost 50% of burn injury patients in the world are children and 25% of them are admitted to hospital with severe burns (P Agbenorku et al., 2013). Children under 5 and adults 60 years and older have the highest mortality rate from fire, heat, and hot substances, but the highest rate of injury is between ages 5 and 30. Other than that, by referring to the preliminary report released by Safe Kids Malaysia, children age ten and eleven years old showed a higher percentage of getting fire and burn related injuries compared to other ages. Half of them, which was 58.6% of students age ten and 53.1% of eleven years old children had injured due to fire and burn related cases ((Kulanthayan et al., 2016).

Burns are the fifth most common cause of non-fatal childhood injuries. Unintentional burns are a leading cause of injury related deaths in young children (Global Burden of Disease Study, 2017; Safe Kids Foundation, 2015). This is due to the nature of their curiosity; in which they might have come into contact with objects that can cause severe injuries (Safe Kids Foundation India, 2015). While another major risk is improper adult supervision, a considerable number of burn injuries in children result from child maltreatment. In addition, low socioeconomic status, young age, parental education, and overcrowding are known risk factors for major burns and minor burn injuries in children which require urgent medical evaluation and appropriate prevention should be taken.

Burns among children may not only cause life-long disability, but also affect the mental health and quality of life of their families, imposing a socioeconomic burden. This not only give effects in great medical costs and economic loss, but also cause immeasurable psychological consequences not only for the child, but also for wider family and community (Safe Kids Foundation India, 2015). Non-fatal burns are a leading cause of morbidity, including prolonged hospitalization, disfigurement and disability, often with resulting stigma and rejection.

Prevention should be the first priority in reducing the intolerable number of injuries and deaths said Dr. Spencer James, senior author on the study and Lead Research Scientist at the Institute for Health Metrics and Evaluation at the University of Washington School of Medicine. Especially as treatment for burns and related injuries remains relatively expensive and requires robust health care services not often available in low- and middle-income countries (Science Daily, 2019).

Although there are many epidemiological studies available in literature, several gaps are yet to be addressed particularly in child burn incidence.

## 1.2 Problem Statements

Burn injuries are tragedy that is underappreciated and can happen to anyone, at any time, and anywhere. Although most burn injuries are brought on by heat from heated liquids, objects, or fire but the injuries can also be brought on by friction, cold, heat, radiation, chemical, or electric causes. Burn injuries causes pain, have an impact on mental health, quality of life, ability to return to employment, following mortality (Logsetty et al., 2016; Mason et al., 2019; Rybarczyk et al., 2017) and leaving behind lifelong physical and psychic scarring (WHO 2018). The majority of studies originate from high-income nations and are closely linked to climate variations, access to resources for different healthcare systems, and changes in environments (Rybarczyk et al., 2017; Stylianou et al., 2015) and fewer resources, geographic restrictions, and higher costs prevent data gathering and restrict access to healthcare in lower-income nations. Moreover, referring to the classification of the types of burns based on the intensity of the damage to the skin, categorized as 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> degree burn, the identification of the degree of burn is very crucial in Malaysia for the children firstly by identification of the type of burn and its cause, followed by the ranking the degree of the burn. Hence the scope of burn injuries covered in this study includes fire safety, burn prevention, the fire response mechanism of the children and parents based on their knowledge for first aid treatment.

In term of unintentional injuries, few studies are available on fire and burn at home among children, road and occupational injuries in Malaysia (Peck, 2011). Heat-related incidents resulted in nearly 9 million injuries and more than 120,000 deaths worldwide in 2017. In an encouraging global trend, the Institute for Health Metrics and Evaluation researchers saw an overall decrease in heat-related injury burden between 1990 and 2017. For example, the global death and disability rates dropped by 47% and 24%, respectively, likely due to safety improvements, fire danger awareness, and increased access to quality health care. Yet heat-related injuries continue to present the greatest burden in low- and middle-income countries. Lower and middle-income countries are both more susceptible to fire, heat, and hot substances as a cause of injury, and also experience higher death rates. Most preventive and acute care strategies, have not been adopted by low- and middle-income countries (Sinha et al., 2019). Despite some of the largest decreases in the age-adjusted rate of new cases since 1990, Laos, Indonesia, including Malaysia remain among the top countries with the highest risk of death given a heat-related injury in 2017.

Children have an inherently higher risk of sustaining burn injuries due to their physical size and skin sensitivity. Most children with burn injuries have anxiety, depression, and oppositional behavior, withdraw from activities, and exhibit adverse effects on body image and self-esteem (Peden et al., 2008). Despite this descriptive finding, no clear association was found between burn injuries



and familial socioeconomic factors (e.g., number of household members, place of residence, occupation, income, types of fuels/appliances in the home). In Malaysia, the report released by Safe Kids, Universiti Putra Malaysia (UPM) has stated that a child dies from a fire or burn in every two weeks with 6.4% of parents reported that there were fire cases in their house in the past two years (Kulanthayan et. al, 2016). The findings from this report are in line with WHO Global Burden of Disease estimating that 265 000 childhood deaths resulting from fire-related burns on a yearly basis and most of them are from low- and middle-income countries. About 54% of the parents reported that their children had suffered from one form of a burn or scald injury in the past two years, followed by 51% of the parents are worried that their children are prone to suffer from a burn or scald compared to any other injury and 11% of the parents stated that schools teach fire safety education on a regular basis (Kulanthayan et. al, 2017).

Family-specific research is therefore needed that can shed light on the macro-level mechanisms at play and possibly also clarify income inequality is associated with rates of burn incidence and its consequences particularly in children.

Previous studies have demonstrated that various factors were linked with burn injuries. For example, those living in deprived and densely populated environments have a greater exposure to a range of hazardous products (Peck, 2011, Burrows et al., 2010, Othman and Kendrick, 2010). A study in Malaysia reported that 47.8% students from rural area while 52.2% students from urban area reported to have a higher percentage of fire and burn related injuries at home (Haliza & Siti Nabila, 2020). A high mortality rate was found in populations where income inequality is higher, this could be due to the lower investments in providing minimum standards of living and adequate housing conditions for the poorest segments of the population. However, the socio-economic factors were less likely to be studied in relation to burn incidence particularly among children. The significance of studying the sociodemographic characteristics and socioeconomic factors implies that these independent variables does have an impact that need to be studied further to determine the prevalence of burn injury, factors associated, the knowledge of the children and their respective parents on first aid for burns, fire emergency response and burn injury preventive measures that need to be taken.

Besides environmental factors such as home circumstances which implies a greater exposure of dangerous inflammables or other hazards which signifies a high potential risk for the children as they are most of their time dwelling in their spaces at home, followed by adults or parents behavioural patterns such as smoking in the house, the usage of heating devices, and short circuit at home or nearby and other implicated inflammable materials (Peck 2011), cognitive factors such as knowledge and awareness about the burn prevention and management were less likely been assessed. Currently, a study reported that only 11% of parents' report that schools frequently teach fire safety education (Sahril et. al., 2014). Hence, this statistic illustrates the need for education efforts

to include messages on proper prevention as fire and burns that are preventable at home while emphasizing on specific behavioral patterns of the adults and educating the children. The development of preventive strategies such as education of vulnerable populations and training of communities in basic first-aid can drastically reduce the frequency and severity of burns sustained (Sinha et al., 2019). The rationale behind the need to assess parents' as well as children's knowledge and awareness is because fire and burn injuries are highly preventable. If sustained during childhood, serious morbidity can persist through adolescence and well into adulthood (Sinha et al., 2019).

Assessment of risks by type and location of burn is an essential prerequisite to developing effective preventive strategies (Heard et al., 2013). To this end, burn-related epidemiological studies among children are less likely to have been conducted vastly which may propose modifiable risk factors which can be addressed in preventive strategies (Ardalan et al., 2017). To date, a study stated that hot objects and flame follow scald burns in children account for nearly a third to a half of all burns seen in infants and toddlers (age 0–4 years) (Hwang et al., 2006). However, according to the findings of (Halil et al., 2021) conducted in Malaysia, the parents of the children have low to moderate knowledge for burn injuries and lack of proper information how to react to burn injuries in cases related to their children. This finding is in line with previous study by (Davies et al., 2013) indicating that more than half of the adult population do not have proper and lack of knowledge concerning first aid and less than one-third of the parents have intense knowledge related to burns' treatments and the sharing of this information to their children.

Based on the identified study gaps, several research questions were deduced to address the issues identified and to initiate new findings and evidences. Hence this study focuses to determine the socio- demographic characteristics such as age and gender and the socio- economic background such as parent education, type of residential, monthly household income and the prevalence of burn injury among primary school students aged 7 to 11 years in Sentul, Kuala Lumpur.

### **1.3 Significance of the Study**

The result of this study will provide the prevalence and also give better understanding on factors associated with burn injury among primary school children. It will also identify how socio-demographic characteristics, socio-economic characteristics of parents, knowledge on factors causing fire, burn and scald injury and knowledge on first aid for burns, fire emergency response and burn injury prevention associated with prevalence of burn injury among children. The findings from this study will add new knowledge in the respective field and will provide useful information for the government or policy makers in terms of planning an intervention or a campaign targeting primary school students and their parents by focusing on the significant predictors of burn injury among



children of this study. Hence, it will give a wake-up call for better safety and well-being for the future generation.

#### **1.4 Research Questions**

Q1: What is the prevalence of burn injury among children ages 7 to 11 years in Sentul, Kuala Lumpur?

Q2: What are the factors associated with burn and scald injury among children ages 7 to 11 years in Sentul, Kuala Lumpur?

Q3: What are the predictors contributing to burn and scald injury among children ages 7 to 11 years in Sentul, Kuala Lumpur?

#### **1.5 Study Objectives**

##### **1.5.1 General Objective**

To explore the prevalence of burn injury and its associated factors among primary school children ages 7 to 11 years in Sentul, Kuala Lumpur.

##### **1.5.2 Specific Objectives**

- i. To determine the prevalence of burn injury among primary school children.
- ii. To determine the socio- demographic characteristics such as age and gender and the prevalence of burn injury among primary school children.
- iii. To determine the socio- economic background such as parent education, type of residential, monthly household income and the prevalence of burn injury among primary school children.
- iv. To determine the causes and the most common place of burn injury among children.
- v. To determine the knowledge on factors causing fire, burn and scald injury, first aid for burns, fire emergency response and burn injury preventive measures among the children.
- vi. To determine the knowledge on first aid for burns, fire emergency response and burn injury preventive measures among the parents of primary school children.
- vii. To determine the factors associated with burn injury among the children.
- viii. To determine the predictors of burn injury among the children.

## **1.6 Hypotheses**

H1: There is a significant association between children's socio-demographic background and burn injury among children.

H2: There is a significant association between parent's socio-economic background and burn injury among children.

H3: There are significant association between children's knowledge on factors causing fire, burn and scald injury, first aid for burns, fire emergency response and burn injury preventive measures with burn injury among children.

H4: There are significant association between parent's knowledge on first aid for burns, fire emergency response and burn injury preventive measures with burn injury among children.

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