

Childhood Thermal Injuries: Preventable Hazard of Domestic Energy Sources in Ghana

D. nii-Amon-Kotei, Dipl. med, Dr. med, FACH, FACH.paed., FWACS
Department of Surgery
School of Medical Sciences
University of Science and Technology
Kumasi-Ghana

ABSTRACT

Childhood thermal injury with its possible complications and high cost of management is seen as a hazard of domestic energy sources in Ghana.

Woodfuel in its natural form as firewood or processed as charcoal is relatively more accessible and therefore a popular energy source in the country, but dangerous to children. Traditional energy converters and places of cooking are also unsafe.

Measures of prevention of the hazard have been discussed.

Keywords: Thermal injuries, energy, childhood

INTRODUCTION

Thermal injuries or burns, the result of devitalisation of living protein through the action of energy, constitute one of the most frequent accidents in children alongside road traffic accidents, fall from heights, poisoning and drowning [5].

Scientists and engineers have concerned themselves with the sources of energy [10,13,14], and their converters [11] in Ghana. This paper relates childhood thermal injuries to the domestic energy sources and their converters in Ghana.

MATERIAL AND METHOD

Records of patients who were admitted with thermal injuries to the Komfo Anokye Teaching Hospital Kumasi-Ghana in seven years (1980 - 1986) were retrospectively analyzed with respect to incidence and age distribution. In another prospective pilot study of one year (1987) records of children admitted with similar injuries to the same hospital were studied. Emphasis this time was placed on the agent of injury and the locality in which the accident occurred, since the retrospective study could not supply this information.

Out of 21,120 patients with various affections who were admitted to the Hospital within the seven years, 1,154 (5.5%) had thermal injuries. Children up to 13 years of age constituted the majority (66.7%), while the rest between fourteen and sixty-one years made up only 33.3% of the injured.

Out of 208 injured children of the prospective study 129 (62.0%) of these children were boys and 79 (38.0%) were girls. Children of pre-school age (1 - 5 years) formed 64.7% of the injured. During the same period 65.1% of the children suffered their injury in the vicinity of domestic cooking places, where traditionally their mothers to whom they are closely attached find their major preoccupation. Seventy-five percent of these mothers were housewives. The rest of the mothers had regular jobs outside the home but left their children in the care of housemaids or grand mothers or other relations, who also were most of the time concerned with cooking.

The agents of injury included burning firewood, charcoal, or when clothing caught fire at cooking places (65.10%). In two children the agents were burning petrol and kerosene, and in one it was burning saw dust.

Complications of the injury included death (5.8%) and wound infection (27.0%) which occurred within the first 14 days after the injury. The patients were hospitalized for 30 ± 9.2 days. Late complications such as contracture and hypertrophic scars were observed, but could not be related directly to the patients of the series.

In a random sample of one hundred houses in which the patients of the prospective study, an occupancy rate between 4.9 and 7.3 was found. While only nine of the houses were occupied by one family, the rest were compound houses occupied by six to ten families.

With the exception of the one-family houses, all others had no confined cooking areas. The cooking was done just where space was found. The energy converters were mainly the traditional coalpot and the earthen hearths (87.6%). The rest had gas and electric stoves in addition to the traditional converters. Fuelwood in the form of charcoal and firewood was the main source of energy. Electricity was mainly used for lighting and powering audiovisual sets, when available in the houses.

D. nii-Amon-Kotei
Dept. of Surgery
SMS, UST, Kumasi, Ghana.



DISCUSSION

In the present study the majority of childhood thermal injuries has been found to occur in the vicinity of domestic cooking places, where heat generated in traditional energy converters is the main source of domestic energy.

Non-commercial energy sources like firewood and charcoal account for 72% of the total energy consumption in Ghana; 90% of which is achieved through fuelwood [14]. In a study conducted in Accra, the sources of domestic energy were found to be charcoal(83%) and fuelwood(6%). Another citation asserts, charcoal to be the predominant domestic fuel (69%) as compared to other sources. The per capita consumption of charcoal in urban areas is estimated at 180g per annum [11]. The same authors estimate the use of oil and electricity for the generation of energy at 20% and 10% respectively as against 63% of woodfuel in 1963 which increased to 70% in 1979 [11].

Metal coalpots(Feu Malagache) commonly used in the sub-Saharan Region and mud or metal firewood stoves serve as energy converters. Energy obtained through the combustion of charcoal and fuelwood in these converters yields heat, the principal, if not the only form of energy in Ghanaian homes.

Electricity, if available in Ghanaian homes, is only limited to a very small section of the population, and it is used mainly for powering audiovisual systems and lighting. Besides, the majority of Ghana's population is found in the rural areas, where fuelwood is yet in abundance, and thereby more accessible than electricity. Deforestation and cultural development is however likely to reverse the situation in favour of more modern sources of energy.

Imported electric and gas cookers are currently more expensive than the traditional mud fire-stoves and coalpots used by the average Ghanaian. In 1992, an electric cooker could only be afforded at a price between ₵80,000. - and ₵150,000. - This is a fortune as compared to the average monthly salary of about ₵15,000.- The subtropical forests and savanna belts in Ghana are claimed to have yet sufficient wood to be combusted directly or in the form of charcoal or even as sawdust briquettes [10] in traditional energy converters. However, whereas the imported or industrially manufactured electric or gas cookers conform to strict international or national guidelines for efficiency and safety, the locally fabricated converters have deficiencies which can serve as sources of danger to the user and his surroundings.

Alongside road traffic accidents, fall from height, poisoning and drowning, thermal injuries are very frequent causes of illness in children [5]. In the present series 15.8% of all admissions to children' surgical ward of the hospital were thermal injury cases. The high involvement of boys and of children below the age of 5 years as found here has been attributed increasing ability of the child to move about [3]. The curiosity of the child being attracted by sparks or flames might also play a role. The vicinity of this group of children around their mothers whose major pre-occupation of the preparation of

meals is also a factor.

The contribution of domestic surroundings to thermal injuries in children has been mentioned(2,7,8,15). In the present study a high percentage of the injuries have been found to originate in the vicinity of cooking places, where the main energy sources are chiefly charcoal and firewood. The direct complications, with respect to the patient have been death, wound infection, contracture and hypertrophic scars.

The impact of thermal injuries, however, is not only limited to the patient alone. The society at large can be affected. The psychological impact of a severe injury is great on the patient as well as on his family [1]. Parents of burnt children may not only need special counselling to overcome guilt, but also have to struggle to meet the relatively high cost of extended hospital admission of their wards. A deposit of ₵5000 - before admission to our hospital in 1992, and the high cost of drugs can hardly be sustained by average worker whose monthly earnings are just about twice this cost of treatment. In the immediate period after the injury, the concern the concern with survival and later the worry about disability and disfigurement are also invariably coupled with high cost of treatment to be borne by the parents of the child and eventually by the society. The disability or death of the injured is also a deficit to a nation's manpower potential.

To this day social and health insurance schemes which could help ameliorate the impact of the injury on the patient and his surroundings are practically non existent in Ghana.

Although early and appropriate management of the fresh thermal injury in qualified hands can save the patient from all these complications, prevention of thermal injuries as a hazard should be a concern for all.

Keeping agents out of reach of children, early introduction and education of the child to the dangers associated with fire and hot objects [3], as well as avoiding children's clothing made out of easily inflammable textiles like wool, nylon or polyester (6) are universal preventive measures against thermal injuries and relatively straight-forward precautions which can be carried out at a very low cost with the cooperation of parents. Much more difficult are the measures within the immediate environment of the child.

In Ghana, the influence of traditional homes with unsafe cooking areas on thermal injuries can be prevented by the enforcement of building regulations. For example the recommended occupancy rate of 2.5 [12] as opposed to the higher rate in the present study must be adhered to.

With respect to the energy converters used in traditional cooking places, suggestions of design features which include insulation of their handles and regulation of draught [11] are useful and should be supported. Popularising gas and electric stoves, which have safer designs to replace the converters of the yet easily accessible and abundant fuelwood can also not only help reduce the relatively high incidence of childhood thermal injuries but halt deforestation with its danger of desertification.

REFERENCES

1. Andreason, N.J.C., Worres, A.S., Hartford, C.E.: Incidence of long term psychiatric complications in severely burned adults. *Ann. Surg.* Vol.174 pp.785-93, (1974).
 2. Berman, W., Goldman, A.S., Reichelderfer, Th.: Childhood burn injuries and death. *Pediatric* Vol. 51, pp. 1069-1071, (1973).
 3. Buienandt, I. and Coerd, I. *Verbrennungen in Kindesalter*, Ferdinand Enke Verlag Stuttgart, pp.6, (1979).
 4. Enninson, J.: The charcoal cycle in Ghana, *ERG Newsletter* Vol. 11, pp. 9-10, (1989).
 5. Gaedecke, R.: *Kinderunfaelle, Notfallmedizin* Vol. 2 pp. 398-400, (1976).
 6. Gordon, P.G., Pressley, T.A.: The fire of children's night-wear: The Australian experience in developing clothing fire hazard standards. *Burns* Vol. 5 pp. 12-18, (1978)
 7. MacMillan, B.G.: Management of Burns in Children. In: R.C. Shirkey, *Pediatric therapy* pp. 1088-1100, Mosby Company, St Louis, (1972).
 8. Murno, I.R., Farmer, A.W., Csima, A., Lindsay, W.K.: An analysis of burns in children. *Canad. Med. Ass. J.* vol.97 pp. 459-463, (1967).
 9. nii-Amon-Kotei, D.: Childhood thermal injuries resulting from thermal indigenous Ghanaian household energy-converters. *ERG Newsletter* Vol. 12 pp. 9-11(1989).
 10. Opam, M.: Substitution of sawdust briquettes for fuelwood in Ghana: A case study of brick and tile factories. *ERG Newsletter* Vol. 10 pp. 17-26, (1983).
 11. Opam, M.: Prospects for improved cook stoves utilization in urban areas of Ghana. *ERG Newsletter* Vol.7/8 pp.41, (1987).
 12. Owusu, D.J., Bofah, R.K.B., Blankson, C.C.T.: A housing survey of Ghana. National low cost housing committee (Report) Dec., (1973).
 13. Tawnawiecz, D.: Report on pilot survey on fuelwood and charcoal consumption in Accra. *ERG Bulletin* Vol. 1 pp.27-33, (1983).
 14. Turkson, J.K.: Village woodlots: Are they solutions to rural energy problems? *ERG Newsletter* Vol.10 pp.27-33, (1983).
 15. Trunkenbrodt, H.: Die Behandlung von Verbrennungen bei Kinder. *Paed. Prax.* Vol. 5 pp. 605-611, (1966).
 16. Stitz, R.W.: Burns in Children- A three-year survey. *Med. J. Austr.* Vol.19 pp.357-361, (1972).
- *N.B. Initially as a paper at the 4th National Energy Symposium 20th - 24th November, 1989, U.S.T. Kumasi.