

# Accidental Childhood Poisoning in Enugu, South-East, Nigeria

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## Abstract

**Background:** Accidental childhood poisoning is one of the recognized causes of morbidity and mortality in children under the age of 5 years worldwide. The prevalence and type of substance ingested vary from place to place and over time. **Aim:** This study was conducted with the aim of ascertaining the frequency and pattern of accidental childhood poisoning in Enugu. **Subjects and Methods:** This retrospective study was conducted at the Emergency Paediatric Unit of the University of Nigeria Teaching Hospital, Enugu, South-East, Nigeria from January 2003 to December 2012 (10 years). All the cases of childhood accidental poisoning that presented within the period were reviewed and important information extracted. **Results:** Sixty-five cases of childhood poisoning were recorded during the 10-year period, giving an incidence rate of 442 per 100,000 children. The mean age was  $22.15 \pm 11.7$  months. Male:female ratio was 1.5:1. The prevalence was higher among those with low socioeconomic background. Kerosene poisoning was the most common agent. The overall mortality rate was 3.1% (2/65). **Conclusion:** Accidental childhood poisoning is common in Enugu, with appreciable mortality, with kerosene being the most common agent. We advocate regulatory policy on proper ways of storing kerosene and other harmful household chemicals and medications.

**Keywords:** Accidental poisoning, Childhood, Kerosene

## Introduction

Childhood poisoning result from a complex interaction of the child, the agent, and the family environment.<sup>[1]</sup> Accidental childhood poisoning is one of the recognized causes of childhood morbidity and mortality in Nigeria.<sup>[2]</sup> Children <5 years are mostly affected because of their innate curiosity, impulsiveness. In addition, among this age group are those undergoing the oral phase of their psychological development. Hence, most childhood poisonings occur from ingestion. Young infants (0- 2 months) are rarely affected because they lack the gross motor control to bring items to their mouth. Ingestion of substances may also be due to factors such as imitation of parental behaviors and parental carelessness.

The incidence and type of substance ingested vary from place to place and over time.<sup>[3-12]</sup> In the developed countries such as the United Kingdom before the stringent regulatory policies, accidental childhood poisoning was a major contributor to Emergency Department presentation and hospital admission.<sup>[11]</sup> A decline in the incidence and mortality of childhood accidental poisoning has been reported in other countries such as Australia, which instituted regulatory policies about 30 years ago.<sup>[12]</sup> Studies<sup>[5-10]</sup> have been published from different parts of Nigeria with some differences in the incidence and pattern of childhood poisoning, kerosene poisoning, however, stands out in most of the studies.<sup>[5-9]</sup> In Nigeria, there are no strict regulatory policies on secure packaging and prescription of medications as well as storage of dangerous household

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chemical to prevent accidental childhood poisoning. This study was conducted to find out the pattern of accidental childhood poisoning in Enugu, South-East Nigeria and compare it with what occurs elsewhere in Nigeria.

## Subjects and Methods

This was a retrospective study that involved the children admitted to the Emergency Paediatric Unit of the University of Nigeria Teaching Hospital, Enugu from January 2003 to December 2012 (10 years). This tertiary institution provides basic and tertiary health care to residents of Enugu State as well as other towns of the South-Eastern States around it. Enugu is an urban area with most inhabitants being civil servant or business men and women. There are few industries within and around the city. There are many surrounding villages whose main occupations are farming and trading.

Before the commencement of the study, ethical clearance was sought and obtained from the hospital's Health Research and Ethics Committee. The admission registers were used to identify all the children who presented with complaints of accidental ingestion of the substance. After that, the case records of the identified children were extracted from the records and necessary data obtained. Information obtained included child's age, sex, date of presentation, poison ingested, the duration between ingestion and presentation and home remedy used. Furthermore, the residential address, parent's occupation and educational background, (the families were assigned socioeconomic classes using the recommended method modified by Oyedeji)<sup>[13]</sup> duration of admission, symptoms and signs as well as the outcome of treatment were obtained. Poisoning in children 5 years of age and above were excluded. The information was analyzed using SPSS version 19, 2010 (IBM Inc., Chicago, Illinois, USA). The analysis was mainly descriptive and results presented as prose and tables. Pearson's Chi-square was used to test for significance at a *P* value level of 0.05.

## Results

A total of 15,062 children presented to the pediatric emergency ward during the 10-year period, of which, 66 were cases of childhood poisoning. One case of poisoning was recorded in an 8-year-old boy, but this was excluded in the analysis, leaving 65 cases. This gives a prevalence rate of 442 per 100,000 children. The children were aged 8–54 months, with a mean age of  $21.2 \pm 8.9$  months. Most (58/65, 89.2%) of the children were below 3 years. Males were more affected, with a male:female ratio of 1.5:1. Table 1 shows the age and sex distribution of the subjects. Most (86.9%) of the children reside in the urban areas. Only 28 (43.1%) children had enough information to classify them into socioeconomic class. Of these, 10 belong to the upper class (classes I and II), whereas the remaining 18 belonged to the lower class (classes III, IV and V).

Kerosene was responsible for most poisoning, accounting for nearly 70% of all the cases of accidental childhood poisoning seen. Other household agents ingested included bleach, soaps, glue, hydrogen peroxide and disinfectant while the medications ingested were paracetamol, antibiotics, anticonvulsants and antipsychotic (haloperidol) drugs. Table 2 shows the substances responsible for the accidental poisonings as well as the outcome.

Table 3 shows the various interventions applied before the presentation. Of the 65 cases of poisoning, only 43 (66.2%) had information on home intervention before the presentation. Palm oil ingestion and induction of emesis were the most commonly used interventions before presentation.

Respiratory features predominated and include cough, fast and difficulty in breathing as well as abnormal chest findings on examination. Other presenting features include vomiting and diarrhea, drooling of saliva and difficulty in swallowing, restlessness, weakness, and fever. One child presented with loss of consciousness while another presented with dyskinesia. Eleven of the children did not have any symptoms while 22 had missing information. Table 4 shows the interval duration between the ingestion of the poison and presentation in the hospital.

Forty-three (66.2%) patients who had complete information on treatment received at presentation; 16 (37.2%) required just observation, 5 (11.6%) required oxygen, 12 (27.9%) received antibiotics either appropriately or inappropriately while 8 (18.6%) received intravenous fluid. Other treatments given include antacid and activated charcoal. There was a significant relationship between the substance ingested and outcome, ( $P = 0.001$ ,  $\chi^2 = 81.26$ ). Most (92.5%) of the children recovered and were discharged, 29 (47.5%) within 24 h of presentation, two (3.0%) were referred for surgery, and both were cases of caustic soda ingestion. There were 2 deaths giving a mortality rate of 3.1%. The deaths both resulted from kerosene poisoning in a 15 and 26-month-old and both presented after 24 h of ingestion. One child left against medical advice (discharge against medical advice), [Table 2].

## Discussion

Accidental childhood poisoning is an important paediatric emergency worldwide. The frequency and pattern of poisoning vary from place to place, depending on the environmental

**Table 1: Age and sex distribution of the subjects**

Age (months)	Frequency		
	Males	Females	Total (%)
<12	2	2	4 (6.2)
12-23	22	16	38 (58.5)
24-35	10	6	16 (24.6)
36-47	3	2	5 (7.7)
48-59	2	0	2 (3.1)
Total	39	26	65 (100.0)

**Table 2: Substances responsible for the accidental poisoning**

Agent	Frequency	Percentage	Outcome			
			Discharged	Surgery	Died	DAMA
Medicine	5	7.7	4	-	-	1
Kerosene	44	67.7	42	-	2	-
Caustic soda	2	3.1	-	2	-	-
Household agent	5	7.7	5	-	-	-
Organophosphates	7	10.8	7	-	-	-
Diesel	1	1.5	1	-	-	-
Cosmetics	1	1.5	1	-	-	-
Total	65	100.0	60	2	2	1

$P=0.001$ ,  $\chi^2=81.26$ . DAMA: Discharge against medical advice

**Table 3: Intervention done at home before presentation**

Intervention	Frequency	Percentage
Induction of emesis	11	16.9
Ingestion of palm oil	13	20.0
Ingestion of milk	4	6.2
Ingestion of coconut water	2	3.1
Combination of emesis and palm oil/milk	3	4.6
None	10	15.4
Missing	22	33.8
Total	65	100.0

**Table 4: Duration between ingestion and presentation**

Duration (h)	Frequency	Percentage
<2	9	13.8
2-<12	20	30.8
12-<24	7	10.8
24-48	4	6.2
>48	3	4.6
Missing	22	33.8
Total	65	100.0

factors. In this study, it accounted for 0.43% of the morbidities seen in the pediatric emergency ward at the University of Nigeria Teaching Hospital, Enugu, Nigeria. This is comparable to studies in other parts of the country<sup>[5-9]</sup> which have values ranging from 0.22% to 0.94%, as well as from other developing countries such as Turkey and Pakistan with values of 0.34% and 0.58%.<sup>[14,15]</sup> It is also similar to what obtains in developed countries like the United States where the rate is about 0.43% was reported in hospital emergency room presentations in 2004.<sup>[16]</sup> The figure is, however, lower than what obtains in Saudi Arabia where values range from 1.7% to 7.2%<sup>[17,18]</sup> In our environment, the figures may actually be higher but for poor health seeking behaviour which affects their rate of presentation as well as the high morbidity from communicable diseases such as sepsis, malaria, and pneumonia<sup>[2]</sup> which has significantly downplayed the morbidity from accidental childhood poisoning. Like in all other similar studies,<sup>[3-18]</sup> males were more affected than females. This may not be unconnected to the more inquisitive and adventurous nature of the boy

child when compared to the girls. Toddlers were affected most as they are still the explorative phase of learning and do so by putting things into the mouth. This is also in agreement with most other studies,<sup>[4-9,15]</sup> but differed from studies from Pakistan<sup>[14]</sup> and Saudi Arabia<sup>[17]</sup> where children 2–3 years and 2–5 years respectively constituted the greater percentage.

The nature of the substance ingested reflects what is commonly found in the child's environment. In this study, kerosene was by far the most common agent responsible for accidental childhood poisoning. Kerosene is found in most homes in Nigeria as it is the most common fuel used in cooking. It is a near colourless fluid and most times, is stored in similar container as water in homes, where potable water is also a scarce commodity. This finding is similar to most studies in Nigeria<sup>[5-9]</sup> and also Pakistan<sup>[15]</sup> and Saudi Arabia<sup>[18]</sup> which also found kerosene to be the most common substance causing accidental childhood poisoning. In Jos, Nigeria, organophosphates predominated.<sup>[10]</sup> In Turkey<sup>[14]</sup> and United States,<sup>[16]</sup> medications were the most common agent of accidental childhood poisoning. Organophosphates in form of pesticides and insecticides as well as medications such as paracetamol, antibiotics and antiepileptic drugs, household agents such as bleach, soap, disinfectants as well as cosmetics were among the agents of poisoning in children from our study. These reflect the nature of objects of interaction between the child and his/her environment. In other parts of Nigeria like the South-West, where traditional mixtures are very commonly used, it was noted to be a common source of childhood poisoning.<sup>[5]</sup> In the Northeast, *Manihot esculenta* (cassava), a food plant which is rich in cyanide also featured prominently.<sup>[7]</sup> This may be related to the traditional way of processing cassava in their environment since cassava is also abundant in our environment and other parts of the country but has not been documented in studies from other parts of Nigeria as a cause of childhood poisoning.<sup>[5,6,8,9]</sup> Caustic soda poisoning has also been documented from other parts of Nigeria.<sup>[5,6]</sup> It has come as one of the causes of poisoning in children because of the increase in home made soaps as part of women empowerment programs. Unlike some other Nigerian studies<sup>[6,8]</sup> where alcohol featured prominently as a cause of childhood poisoning, no case was due to alcohol in our study despite the common availability of alcohol in our environment. In Nigeria, there are no functional regulatory policies for secured packaging of dangerous household chemicals, use of childproof

container for prescription drugs. Furthermore, the easy access to medications which are easily purchased over-the-counter makes them readily available in homes.

Most mothers and caregivers usually resort to the administration of palm oil and induction of emesis as a first aid treatment which may cause aspiration and thereby making an asymptomatic child symptomatic or worsen an already bad situation. This practice may also delay presentation. In this study, a higher proportion presented between 2 and 12 h, by which time symptoms may have manifested. The symptoms depended on the agent of poisoning and the type of injury to the tissues. The severity of symptoms could be significantly influenced by the type of home remedy used as well as the interval between accident and admission.<sup>[9]</sup> Respiratory symptoms predominated as a result of the high prevalence of kerosene poisoning, which usually result in pneumonitis from inhalation or aspiration of this volatile hydrocarbon. The greatest morbidities were from the two cases of caustic soda ingestion, which resulted in several surgical interventions. The only deaths were as a result of kerosene poisoning which were also related to late presentation. This is similar to those of Ilorin (0.9%)<sup>[9]</sup> and Jos (3.8%),<sup>[10]</sup> (both from North-Central, Nigeria), but lower than those of Calabar, South-South Nigeria (20%)<sup>[6]</sup> and Ife, Southwest, Nigeria (11.9%).<sup>[5]</sup> The higher mortality in the Calabar study was due the high incidence of caustic soda ingestion among the subjects studied with resultant high mortality (100%). Whereas in the Ife study, 80% was due to herbal concoctions which is prevalent in the region and constituted 80% of the mortality in their study.

## Conclusion and Recommendation

Accidental childhood poisoning is common in Enugu, just like in many other regions of the Country, with some differences in the pattern when compared to some other regions. There is thus, the need for public enlightenment on the proper storage of kerosene as well as the need for immediate presentation if accidental ingestion occurs. There is also the need to discourage the use of home remedies that may cause both delay in presentation and worsening of symptoms. An alternate source of cooking fuel such as liquefied gas may also help in reducing the morbidity and mortality from kerosene poisoning. We strongly advocate for regulatory policies on safer ways of keeping dangerous household chemical and drug prescription to reduce the morbidity and mortality associated with childhood accidental poisoning as it has continued to be a major challenge in public health.

## Limitation of the study

Since this was a retrospective study, there were some missing case notes that could not be retrieved to obtain full information and also some incomplete information on some available case notes.

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## Conflicts of interest

There are no conflicts of interest.

## References

1. Dart RC, Rumack BH. Poisoning. In: Hay WW, Levin MJ, Sondheimer JM, Deterding RR, editors. *Current Diagnosis and Treatment in Pediatrics*. 18<sup>th</sup> ed. United States: McGraw-Hill; 2007. p. 335.
2. Abhulimhen-Iyoha BI, Okolo AA. Morbidity and mortality of childhood illnesses at the emergency paediatric unit of the University of Benin Teaching Hospital, Benin city. *Niger J Paediatr* 2012;39:71-4.
3. Petridou E, Polychronopoulou A, Kouri N, Karpathios T, Koussouri M, Messaritakis Y, *et al.* Unintentional childhood poisoning in Athens: A mirror of consumerism. *Clin Toxicol* 1997;35:669-75.
4. Singh A, Choudhary SR. Accidental poisoning in children. *Indian Pediatr* 1996;33:39-41.
5. Adejuyigbe EA, Onayade AA, Senbanjo IO, Oseni SE. Childhood poisoning at the Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria. *Niger J Med* 2002;11:183-6.
6. Ochigbo SO, Udoh JJ, Antia-Obong OE. Accidental childhood poisoning in Calabar at the turn of the 20<sup>th</sup> century. *Niger J Paediatr* 2004;31:67-70.
7. Oguche S, Bukbuk DN, Watila IM. Pattern of hospital admissions of children with poisoning in the Sudano-Saharan North Eastern Nigeria. *Niger J Clin Pract* 2007;10:111-5.
8. Ibekwe RC, Amadife MU, Muoneke VU, Onyire BN. Accidental childhood poisoning in Ebonyi State University Teaching Hospital (Ebsuth). Abakaliki, South Eastern Nigeria. *Ebonyi Med J* 2007;6:26-9.
9. Fagbule DO, Joiner KT. Kerosene poisoning in childhood: A 6-year prospective study at the University of Ilorin Teaching Hospital. *West Afr J Med* 1992;11:116-21.
10. Shwe DD, Toma B, Pate SI, Adedeji I, Oguche S. Profile of hospital admissions of childhood poisoning at a North-Central Nigerian Tertiary Health Care Centre. *Jos J Med* 2013;7:5-7.
11. Thompson JP, Casey PB, Vale JA. Suspected paediatric pesticide poisoning in the UK. II - Home Accident Surveillance System 1989-1991. *Hum Exp Toxicol* 1994;13:534-6.
12. Pearn J, Nixon J, Ansford A, Corcoran A. Accidental poisoning in childhood: Five year urban population study with 15 year analysis of fatality. *Br Med J* 1984;288:44-6.
13. Oyedeji GA. Socio-economic and cultural background of hospitalized children in Ilesa. *Niger J Paediatr* 1985;12:111-7.
14. Andiran N, Sarikayalar F. Pattern of acute poisonings in childhood in Ankara: What has changed in twenty years? *Turk J Pediatr* 2004;46:147-52.
15. Abbas SK, Tikmani SS, Siddiqui NT. Accidental poisoning in children. *J Pak Med Assoc* 2012;62:331-4.
16. Franklin RL, Rodgers GB. Unintentional child poisonings treated in United States hospital emergency departments: National estimates of incident cases, population-based poisoning rates, and product involvement. *Pediatrics* 2008;122:1244-51.
17. Izuora GI, Adeoye A. A seven-year review of accidental poisoning in children at a Military Hospital in Hafr Al Batin, Saudi Arabia. *Ann Saudi Med* 2001;21:13-5.
18. Al Hazmi AM. Patterns of accidental poisoning in children in Jeddah, Saudi Arabia. *Ann Saudi Med* 1998;18:457-9.