

Accessibility of Chemicals a Risk of Unintentional Ingestion of Harmful Chemicals among Under-Five Children in Calabar-South LGA of Cross River State

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ABSTRACT

Introduction: Unintentional injury remains the leading cause of morbidity, mortality and disability among under-five children worldwide accounting for nearly 40 per cent of all deaths in this age group (1). The YPLL rate due to unintentional injuries among children was five times higher than the rate for cancer, 13 times higher than the rate for heart disease, and 31 times higher than the rate for influenza and pneumonia (2). This study determined the relationship between accessibility of chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals. **Materials and Methods:** Analytic epidemiology (Case-control) design was used for the study. A multi-stage simple random sampling technique was used to draw samples of 120 (60-case and 60- match-able controls) under-five children living with their mothers/caregivers in Calabar South LGA of Cross Rivers State. A structured questionnaire was used for data collection after being validated and its reliability tested. The data collected was analysed using frequencies, percentage, the hypotheses (strength of association) was tested using odd ratio at ≤ 0.05 level of significance. The result revealed that under-five children in Calabar South LGA, have 0.382 odds(less likelihood)of having unintentional ingestion of harmful chemicals substances when the storage place of the chemical substance are out of reach of the child (OR= 0.382; CI = 0.155 - .943; p= 0.033). The result also shows that under-five children have 2.024 odds (likelihood) of having unintentional ingestion of harmful chemicals substances when the chemical containers are not removed from the reach of the child immediately after us (OR= 2.024; CI = 0.838 - 4.890; p= 0.114). **Conclusion:** finding from this study will help to educate and encourage mothers/ caregivers of under-five children in Calabar-South on the importance to optimise the supervision of the under-five child.

Key words: Calabar South, Nigeria, Under-Five Children, Unintentional Ingestion of Chemicals, Accessibility.

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INTRODUCTION

Injury is defined as the physical damage to human body, when subjected to energy in an amount that exceed the threshold of physiological tolerance, it can be chemical, thermal, or mechanical (3). Approximately 3 million people each year swallow or have contact with a poisonous substance and children under the age of 5 makes greater number (7). However, injuries are categorized as intentional or unintentional injuries. Unintentional injury consists of subset of injuries for which there is no evidence of predetermined intent to cause harm, (4). The most common unintentional injuries result from motor vehicle crashes, falls, burns, drowning, ingestion of poisonous substance and aspirations (1). Unintentional ingestion of chemical substance by an under-five child refers to an event in which a person, usually a young child, accidentally ingest chemicals (3). This occurs most often in young children as they tend to explore their world and often learn about new things by putting them in their mouth. The symptoms greatly depend on what the child ingested, the amount ingested and their general health. Some notable symptoms include, nausea, vomiting, drowsiness, tummy pain, burns or damage inside the mouth and food pipe (oesophagus), fits (seizures), respiratory or cardiac arrest (where the child's breathing or heart stops), unconsciousness (coma) or death (5). In Nigeria there is dearth of data that shows the burden of unintentional poisoning among under-five children. Although a lot of studies have characterize accidental poisoning patterns and its association among paediatric age group. However, few studies have determined quantitatively the relationship between accessibility of harmful chemicals by under-five children and risk of unintentional ingestion of harmful chemicals. It is on these grounds that the researcher has designed this study, using analytic epidemiology (case-control) to determine the relationship between accessibility of chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals.

MATERIALS AND METHODS

Case-control (retrospective) study design was used to explore the relationship between accessibility of chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals. 120 (60-case and 60- match-able controls) under-five children living with their mothers/caregivers in Calabar South LGA of Cross Rivers State, were recruited through the use of multistage simple random sampling technique by balloting without replacement. A structured self-administered

questionnaire containing open-ended and closed-ended questions was developed and used for data collection. It was administered after explaining the purpose of the study to the mothers/caregivers of under-five children. Specific oral information on the purposes of the study was given to mothers, and their oral consent obtained before inclusion in the study. Confidentiality of information was maintained throughout the study. The completed questionnaire was collated and entered into the computer. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21.0 computer software, odds ratio (OR) was used to determine the relationship between accessibility of chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals. $P < 0.05$ was considered statistically significant.

RESULTS

Accessibility to chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals

Result from table below shows that under-five children have 0.382 odds(less likelihood) of having unintentional ingestion of harmful chemicals substances when the storage place of the chemical substance are out of reach of the child (OR= 0.382; CI = 0.155 - .943; $p= 0.033$) compared to when the storage place is easy to reach. The result also shows that under-five children have 2.024 times odds (high likelihood) of having unintentional ingestion of harmful chemicals substances when the chemical containers are not removed from the reach of the child immediately after use (OR= 2.024; CI = 0.838-4.890; $p= 0.114$) compared to when there are removed immediately after use.

Also, under-five children who are left alone all by them self for several hours or munities are 1.429 times odds to have unintentional ingestion of harmful chemicals substances (OR= 1.429; CI = .622 – 3.285; $p=.399$), when compared with under-five children who are never left alone all by them self. Under-five children have 5.364 times odds of unintentionally ingesting harmful chemicals substances (OR= 5.364; CI = .607- 3.365; $p=.041$) when house hold chemical container have no tamper prove seal/ child resistant cover, compared to when the house hold chemical have tamper prove seal/ child resistant cover . Under-five children have 0.173 odds(less likelihood) of unintentionally ingesting harmful chemicals substances (OR= 0.173; CI = 0.088 - 1.548; $p=.041$) when

the substance have attractive colours, when compared with substance without colour. Under- five children are 2.090 times more likely to have unintentional ingestion of harmful chemicals

substances when there are design/shape (below) drawn on the body of the container (OR= 2.090; CI = 0.526 -8.308; p=.001) compared with container without design or shape.

Table 1: Accessibility to chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals

Risk-disposing factors	Total (n)	Proportion %	p-value	Odd Ratio OR	95% CI	
					Low	high
Can the storage place of this household substance be said to be out of reach of the child						
very easy to reach	93	77.5	0.114	1.00	0.155 - .943	
not easy to reach	27	22.5		0.382		
How soon is this household substance removed from the reach of the child after use						
several hours/few minutes	27	22.5	0.033	2.024	0.838 - 4.890	
Immediately	92	77.5		1.00		
How often do you leave your child all by him/her-self in a day						
Countless time (few minutes, few hours, several hours)	28	23.3	0.399	1.429	0.622 - 3.285	
No time	92	76.7		1.00		
Does container of the household substance have any of the following						
No cover	34	28.3	0.041	5.364	0.607- 3.365	
tamper prove seal/ child resistant cover	86	71.7		1.00		
What was the colour of the container having the ingested dangerous household substance						
with colours/ attractive ones	6	5.0	0.001	0.173	0.088 - 1.548	
unattractive/no colour	114	95		1.00		
Was any of these design/shape (below) drawn on the body of the container						
with shape/design(orange shape, baby shape, chocolate shape, lemon shape, nutrition table)	57	47.5	0.001	2.090	0.526 - 8.308	
without shape/design	63	52.5		1.00		

DISCUSSION

Relationship between Accessibility to chemical products by under-five children in Calabar-South LGA, Cross rivers State and risk of unintentional ingestion of harmful chemicals

In this study under-five children are 2times more likely to experience unintentional ingestion of chemical if the mother/ caregiver fails to remove the chemical container away from the

reach of the child immediately after use (OR=2.024CI=.838-4.890, p=.033), this showed a strong statistical relationship with risk of unintentional ingestion of chemical among under-five children in Calabar South LGA of cross Rivers state (0.33<P>0.05).

Another important finding from this study is that under-five children are 5 times more likely to experience unintentional ingestion of chemical when there is no airtight/child

resistant cover for chemical containers (OR=5.364, CI= .607-47.365, p=.041), this also showed a strong relationship with risk of unintentional ingestion of chemical statistically significant at (0.041<P>0.05). This finding shows a need for continuous emphasis on the fabrication and design of airtight/child resistant cover for chemical product container. Having attractive shapes/design drawn on the body of the chemical container (OR=2.090, CI=.528-8.308, p=.001) showed a strong relationship with risk of unintentional ingestion of harmful chemicals among under-five children in Calabar South LGA of Cross Rivers State as under-five children are 2 times more likely to experience unintentional ingestion of harmful chemicals. Another important finding from this study is that under-five children who are left alone all by him/her-self in a day with little or attention has 1.429 times odds of experiencing unintentional ingestion of harmful chemical. This finding also portrays the curiosity of an under-five child to get close to anything around the environment.

CONCLUSION

Findings from this study have shown that application of analytic epidemiology for disease control and prevention of under-five morbidity and disability in the population is feasible. Findings from study will give room for the integration/inclusion of child welfare assessment in the routine health surveillance report. The general perception of accessibility to harmful chemicals being a risk factor to unintentional ingestion of chemicals among under-five children, has been tested in this study and is now factual scientifically. Finally, these findings will help to educate and encourage mothers/caregivers of under-five children in Calabar-South on the importance to optimise the supervision of the under-five child.

RECOMMENDATIONS

- 1) The researcher recommends that mothers of under-five children in Calabar South LGA Cross Rivers State, Nigeria should optimise the supervision of their under five children to prevent unintentional ingestion of harmful chemicals.
- 2) Mothers of under five children in Calabar South LGA, should also report any unintentional ingestion of chemicals or other product to the nearest Health Centre/facilities to ensure proper treatment and care for their child especially in extreme cases of overdose.
- 3) The researcher proposes the development of under-five children injury assessment check-list for the routine

surveillance/monitoring of under-five child health status especially in the middle and low income countries.

- 4) Pharmaceutical and household chemicals production companies should ensure that all pharmaceutical and chemical products are tightly covered with child resistant/tamper prove.
- 5) In other to maintain safer environment for the under-five child, there is a need for collaboration between the health sector and the manufacturing industry to ensure that the recommendation enlisted above (recommendation number 2) is constantly maintained and applied.
- 6) Due to the limitations of case-control study the researcher recommends a longitudinal study (cohort study) in other to explore multiple exposure that predispose under-five children to unintentional ingestion of harmful chemical.

DEDICATION

This research work is dedicated to **Professor. O. C. Abanobi, PhD. M.P.H** (+of blessed memory), professor of Public Health Epidemiology and Disease control. Federal University of Technology Owerri and African Institute of Public Health Professional.

AUTHORS' CONTRIBUTIONS

Nwachukwu Christian C. conceived the study, designed the questionnaire, and performed data collection and analysis.

Onyeugo Glory Ugochi: preformed the critical review of the manuscript.

Ugboodu Judith Ifeanyi: participated in data collection and reviewing of related literature.

Chikwe, Chidinma Miriam: reviewed and critically appraised the instrument of data collection

REFERENCES

1. Stewart S, Adnan H, Hadley KH, Kent S. Unintentional injuries: Magnitud, prevention, and control. *Annu Rev Public Health* 2012;33:175-91.
2. Centers for Disease Control and Prevention. National Action Plan for Child Injury Prevention. An Agenda to Prevent Injuries and Promote the Safety of Children and Adolescents in the United States. Atlanta: Centers for Disease Control and Prevention; 2012. Available from: <http://www.cdc.gov/safechild/nap>. [Last accessed on 2017 Aug 24].
3. World Health Organization. World Report on Child Injury Prevention: A WHO Plan of Action. Geneva: World Health

Organization: 2008. Available from: [http:// www. whqlibdoc. who.int/ publications/ 2006/9241593385_eng.pdf](http://www.who.int/publications/2006/9241593385_eng.pdf). [Last accessed on 2017 Aug 24].

4. Norton R, Hyder AA, Bishai D, Peden M. Unintentional Injuries. In: Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans BD, *et al.*, editors. Disease Control Priorities in Developing Countries. 2nd ed., Ch. 39. Washington, DC: The International Bank for Reconstruction and Development, The World Bank; 2006.
5. Edelu BO, Odetunde OI, Eke CB, Uwaezuoke NA, Oguonu T. Accidental childhood poisoning in Enugu, South-East, Nigeria. *Ann Med Health Sci Res* 2016;6:168-71.
6. Azizi BH, Zulkifli HI, Kasim MS. Risk factors for accidental poisoning in urban Malaysian children. *Ann Trop Paediatr*

2013;13:183-8.

7. American Academy of Pediatrics, (2019). Poison Prevention & Treatment Tips for Parents. <https://www.healthychildren.org/English/safety-prevention/all-around/Pages/Poison-Prevention.aspx>. Accessed 20/10/2021.

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