



## EXPIRED AND LEFTOVER MEDICINES IN THE HOME: POTENTIALS FOR ACCIDENTAL DRUG POISONING IN CHILDREN

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### ABSTRACT

The unrestricted access to prescription and non-prescription products has led to the growing number of pharmaceuticals in the homes most of them expired and unsafe. No information on the safety of taking expired drug has been published. This study was designed to determine the level of home-stocked medicines and the number of young children in the community as a measure of the population's vulnerability to accidental poisoning from expired and leftover medicines in the home. A cross section of the community consisting of 210 households were recruited and interviewed using a questionnaire instrument structured for semi in-depth interviews. Identified medicine items were recorded and categorised. One third of the community population was found to be younger children 0 – 5years old who are at risk of accidental drug poisoning. A total of 342 medicine items were found in 210 households with 39% of them expired. Parental educational level and employment status did not significantly influence the keeping of expired drugs in the home.

**Key Words:-** Expired/leftover medicines, Household, Children, Accidental drug poisoning.

### INTRODUCTION

Essential medicines save lives, reduce suffering and improve health only if they are not expired, are of good quality, safe, available, affordable and properly used. Keeping unwanted or expired medications in the house potentially exposes the family to risks such as accidental poisonings especially that the drugs are mostly not in their original containers for stability and easy identification. It is important to keep in mind that once a drug container is opened or drugs are transferred from their original containers to another, the manufacturer's expiry date is no longer reliable as its stability could be compromised once exposed to light, heat and humidity. This is because the

active component get degraded and converted to some toxic and non-toxic compounds which do not have efficacy for intended therapy. Thus, the expiry date itself says it's not worthy enough for use. Unused medicines in households are indicative of medicine wastage which have an economic impact on the healthcare system. Leftover medicines in the homes would be estimated to cause billions of dollars annually worldwide (Braund *et al.*, 2009, Zargarzadeh *et al.*, 2006, Hisham 2003, Asa *et al.*, 2012). Several reasons have been identified as causes of unused medicines in the homes to include: over prescribing, a change in the treatment plan, patients no longer in the need of their medicines, adverse drug events, medicines reaching expiry dates, and non-adherence to therapy (James *et al.*, 2009, Ruhoy *et al.*, 2008).

Self-medication apart from obtaining and consuming drugs without the advice of a qualified

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personnel also includes acquiring medicines without a prescription (OTC), sharing medicines with relatives or friends or using left-over medicine stored at residential places (Montastruc *et al.*, 1997). Easy access to home-stocked medicine has enabled a high consumption rate of medicine for self-limiting diseases. Self-medication and the use of leftover drugs are widespread in countries where drugs are sold without prescriptions (Stratchounski *et al.*, 2003, Okumura *et al.*, 2002) in which Nigeria is no exception. A study in Malaysia reported that over 16% of a study population revealed total ignorance of the symptoms that required the use of home-stocked medicines (Ali *et al.*, 2010).

Children explore their environment as part of their normal, natural development. They learn about new things by playing with them, trying to open containers, mimicking what they see siblings or adults do. The growing use of prescription and non-prescription products and sleep aids by adults has led to accumulation of prescription, over-the-counter medicines, vitamins, herbs and dietary supplements in the home, most of them expired. These products can be accessed by curious children and coupled with their natural instincts to put things in their mouth constitute potential avenues for accidental poisoning in children from home medicines. When children have access to parent, sibling or grandparent's medicines, it can be an accident waiting to happen.

No information on the safety of taking expired drugs has been published. Toxicity due to ingestion, injection, or topical application of drug formulas after their expiration date has not been reported as well. However, on one occasion it has been reported that the use of degraded tetracycline caused renal tubular damage in a patient while studies has revealed similar damaging effects in rats and dogs (Benitz and Diermeier, 1964). However, the expiration date specifies that date the manufacturer guarantees the full potency and safety of a drug. This study was designed to determine if unused and expired medicines are kept in homes where there are young children in the community of study and to educate parents on the danger of keeping leftover medicines in the home with toddlers.

## METHODOLOGY

### Study area

The study was undertaken in some households in Lohmak, a semi-urban community in Langtang North LGA of Plateau state, Nigeria. The community is inhabited by people from different religious, educational and social backgrounds but the Taroh-speaking ethnic group forms the majority. The major preoccupation of the

community is subsistence agriculture.

The social amenities available in the community include a primary and a secondary school, two patent medicine stores, primary healthcare clinic, electricity, access road but no portable water.

At the commencement of this study, houses in the community were enumerated from where we came up with an estimated 300 houses some of which were not yet inhabited. These houses gave us an estimated  $300 \pm 20$  households taking note of houses not yet occupied and houses with more than one household.

### Study instrument

This was a questionnaire structured for a semi in-depth-interview (IDI).

The first section of this questionnaire was the household demographics and the second section centres on medications (and their characteristics) present in the homes and reasons for keeping them.

A visit was made to each participating household. During the visit, the aim and scope of the survey was explained to the household members and their informed consent obtained verbally before the interview. Household members were informed that information collected would be confidential. A structured interview was conducted, guided by the study instrument containing close and open ended questions. Responses and identified medicine items were recorded in the study instrument.

Households found keeping expired medicine items were educated about the dangers of keeping such medicines and were advised to return them to the Pharmacy or clinic for proper disposal to avoid accidental drug poisoning.

### Data analysis

Data collected on the questionnaire were entered into the Microsoft excel spread sheet, coded and transferred into statistical package for social sciences (SPSS) version 17.0 and descriptive statistics generated. Chi-square was used to test for relationships.

## RESULTS

A total of 210 households were interviewed giving a response rate of 70% of the estimated households. The population of the 210 households was found to be 1812 people with 559 of them being children 5yrs old or less. A total of 342 medicine items were found in the households interviewed. Of the 342 medicine items, 134(39%) had expired. The expired drugs were found in 93 households. Household demographics revealed that three quarters of the households had between 1-10 people per household while the rest had more than 10 people per

household. The average household size is 9 people per household. About 93% (n=195) of households had between 0-5 children 5years old and below and an overall average of 3 children per household age 0-5years old. About 70% of fathers and 85% of mothers interviewed in the community are unemployed (Table 1).

The majority of dosage forms of medicine items found in households were solid oral dosage forms. This is made up of 76.3% tablets and 4.4% were capsules, others are 10.2% syrups, 7.3% suspensions and 0.9% each of

mixtures and injections (table 2). Tablets are the most stored expired drugs found in homes followed by syrups and suspensions. About 95% of expired drugs kept by households are for future use in case of an emergency need for the drugs. The largest (43%) single therapeutic class are the anti-infectives and 3% of the expired drugs found in households were still being used (Table 3). Household demographics were not found to significantly influence the keeping of expired medicines by household members (table 4).

**Table 1. Households' Demographics**

Demographic	Household Frequency	Percentage
<b>Household size</b>		
1-5 people	39	18.6
6-10 people	122	58.1
11-15 people	33	15.7
>15 people	16	7.6
<b>Mean</b>	9 people per household	
<b>Number of children ≤5 years</b>		
0-2 Children	126	60
3-5 Children	69	32.9
>5 Children	15	7.1
<b>Mean</b>	3 children ≤ 5yrs old per household	
<b>Father's education level</b>		
Below secondary	66	36.3
Secondary	72	39.6
Tertiary	44	24.2
<b>Father's employment status</b>		
Employed	55	30.2
Unemployed	127	69.8
<b>Mother's education level</b>		
Below secondary	79	41.8
Secondary	89	47.1
Tertiary	21	11.1
<b>Mother's employment status</b>		
Employed	27	14.3
Unemployed	162	85.7

**Table 2. Dosage Forms of Drugs Kept in the Homes**

Dosage form	Frequency	Percentage
Capsules	15	4.4
Mixture	3	0.9
Suspension	25	7.3
Syrups	35	10.2
tablets	261	76.9
injections	3	0.9

**Table 3. Profile of expired drugs kept by households**

Profile	Frequency	Percentage
<b>Dosage form</b>		
Capsule	3	2.2
Suspensions	10	7.5
Syrups	13	9.7
Tablets	106	79.1
Injections	2	1.5
<b>ATC (Classification) Code</b>		
A	19	14.2
B	7	5.2
C	16	11.9
H	6	4.5
J	58	43.3
M	4	3
N	10	7.5
P	7	5.2
R	7	5.2
<b>Reasons for Keeping the Drugs</b>		
In case of emergency need	61	45.5
For future use	66	49.3
To recall the name	3	2.2
Still being used	4	3

**Table 4. Relationship between household demographics and reasons for keeping expired drugs**

	Reasons for keeping expired drugs				significance
	In case of emergency	To remember the name	For future use	Still being used	
<b>Parentage</b>					
Single	11	0	10	0	
Monogamous	23	0	22	2	p>0.1
Polygamous	9	2	11	1	
<b>Household size</b>					
1 – 5	4	0	2	0	
6 – 10	23	0	21	2	P>0.1
11 – 15	16	2	20	1	
<b>Father's education</b>					
None	9	2	9	1	
Primary	2	0	6	0	
Secondary	16	0	18	1	P>0.1
Tertiary	9	0	6	1	
<b>Father's occupation</b>					
Employed	11	0	11	1	
Not employed	25	2	28	2	P>0.1
<b>Mother's education</b>					
None	12	2	15	0	
Primary	6	0	2	0	
Secondary	19	0	17	0	P>0.1
Tertiary	3	0	3	1	
<b>Mother occupation</b>					

Employed	5	0	2	1	
Not employed	35	2	35	1	$P>0.1$

## DISCUSSION

Household surveys are relatively difficult to conduct. It was difficult for male data collectors to enter some houses in the absence of a male in the house. With the rising danger associated with large quantities of medications in the homes, the number of accidental drug poisoning among young children has grown over the last seven years (Tara Parker-Pope 2011). In this community of study, family sizes were large with a corresponding high number of young children in each household. Young children 0-5 years old constituted 31% of the population of interviewed households. These children are prone to accidental poisoning from home-stocked medicines. Home keeping of medicines by these households is favoured by their parents' poor educational status and lack of paid employment. This assertion is supported by the finding of a study in Basrah, Iraq by Jassim 2010 that the least educated household heads were found to be four times more likely as the University-educated household heads to have expired drugs in their houses.

Over 19% of expired and unused medicine items found in households in this study were liquid dosage forms – mixtures, suspensions and syrups. These liquid dosages are generally not as stable as the solid forms of medicines. Some of these were half of their original volumes while some were in secondary containers without proper label and vital medicine information. These pose great potential for inappropriate use and health hazard. This hazard is most likely as results of several studies revealed poor storage of medicines in the home (Enato *et al.*, 2011, Asa *et al.*, 2012, Campbel *et al.*, 2013). Overall, 80% of the medicine items found in the households were either expired or leftover all of which are not supposed to be in the homes. Similar studies has also revealed that about 50% of medicines found in the households were not in current use and about 40% of those medicines were expired (Skinner RF *et al.*, 1987, Abou-Auda HS, 2003) while Wasim *et al* in another household survey in India in 2013 reported that almost three quarters of households (74.67%) kept leftover medicines at home.

Anti-infectives formed the majority of the classified medicine items on the ATC code (Table 3). Being a semi-urban settlement without source of portable water, infectious diseases may be the bane of their healthy living. This may have increased the demand for anti-infectives in

the community with a corresponding accumulation of leftover in the homes. This is a potential hazard happening or waiting to happen as misuse of antibiotics may lead to the development of antibiotic resistance (Vanden *et al.*, 2003).

Tablets were found to constitute almost 80% of the expired medicine items kept by households. This may be due to the fact that it is the most prescribed dosage form worldwide. Unfortunately, over 97% (n=131) of the 134 expired medicine items found in households were either being used or intended for future use. While this is alarming, it is common practice in poor households in developing countries like Nigeria where studies have shown that as high as 23% of weekly household expenditure are spent on treating one episode of illness or the other and consumers pay up to 64 times the international reference price for medicines to obtain medications from health facilities (FMH, 2006).

Though household demographics were found not to influence the keeping of expired and leftover medicines by household members, the study revealed that more of the expired drugs were found in households with large family size and those whose either or both parents were uneducated and or unemployed. One way to protect the family and especially prevent accidental drug poisoning in children is by safely and responsibly disposing of expired and unwanted pharmaceuticals. Parents and carers therefore must take responsibility for making the home safe for children.

## Limitation

Medicines not in their original packages were classified based on the self-reported use by household members interviewed some of which may not be correct. Expiration of drugs in secondary containers was estimated from their dates of purchase.

## CONCLUSION

This survey concludes that every household in the community keep leftover and expired drugs in their homes for future use. One third of the community populations are young children in their vulnerable age to accidental drug poisoning from home-stocked medicines. More than half of the medicine items found in the homes had expired.

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