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Research Article

Parents' Knowledge, Attitudes and Use of Antibiotics in Upper Respiratory Infections in Nigerian Children

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ABSTRACT

Parental knowledge of antibiotic use in upper respiratory tract infections (URTI) impacts significantly in the preservation of antibiotic efficacy, yet has not been adequately studied in Nigerian settings. This present study evaluated the knowledge, attitudes and self-medicating practices of caregivers towards the use of antibiotics in URTI among children. The study was a cross-sectional and prospective survey. Parents visiting two hospitals (Nsukka General Hospital - rural and Enugu State University of Technology Teaching Hospital- urban) with their sick children (12 years and under) were approached to complete a 24-item questionnaire. The items assessed parental knowledge of, attitudes and self-medicating practices towards antibiotics in cases of URTI. Frequencies, means and inferential multivariate (chi-square, t-tests and regression) data analysis were conducted. The parents exhibited poor knowledge in most of the knowledge items. Younger parents, those visiting the urban hospital and those with higher educational status exhibited significantly better knowledge of antibiotics and URTI ($p<0.05$). The parents indicated marginally accepting attitudes towards antibiotics use and misuse and this was influenced largely by better antibiotic knowledge and better educational qualifications ($p<0.001$). However parents from both hospitals frequently self-medicated (88.6%) and acknowledged poor practices towards antibiotics such as the use of left over antibiotics. Majority (85%) of the parents also said they received antibiotics after they demanded it from their physicians. Parents in these study settings in Nigeria, possessed poor knowledge and positive attitudes of antibiotic use in their children, and exhibited poor practices when utilizing them.

Keywords: *Antibiotics, attitude, caregiver, children, misuse*

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INTRODUCTION

Nigeria has a widening differential socio-economic and demographic profile and it is facing a lot of health challenges. One of such health challenge is the growing burden of antimicrobial resistance (AMR) driven mostly by poor antibiotics usage (NCDC, 2017). A recent global surveillance report on AMR estimates that 10 million people by 2050 will die every year due to AMR (O'Neill, 2014). Crude estimates project that 40% of these 10 million deaths from AMR will occur in Africa and Nigeria will not be left out (NCDC, 2017).

Young children are more susceptible to upper respiratory tract infections (URTI) and are more likely to consume antimicrobials compared to their older counterpart (Dong *et al*, 2008; Molstad *et al*, 2008). Evidence from the literature suggests that majority of the upper respiratory tract infections have a viral origin, yet the use of antibiotics for such illnesses remain high (Elan *et al*, 2001; Pechere, 2001).

WHO reports that 20-50% of antimicrobial prescriptions is inappropriate and is a major contributor to the menace of AMR globally (WHO, 2007). Factors identified to explain the inappropriate use of antibiotics in children include unrestricted access to antibiotics without prescriptions, physicians' overprescribing of antibiotics to treat viral and fungi infections and parents' limited knowledge as to how antibiotics should be used (CDC, 2013; WHO 2015).

Studies conducted in developing countries in Africa have focused mainly on direct antibiotic abuse and public views on general antibiotics misuse. In the study by Ekwuochi *et al* (2014) which evaluated the prevalence of use of unprescribed antibiotics for URTIs among children 5 years and younger, it was reported high antibiotics abuse among the mothers

surveyed and especially among those with higher educational status and with older children (Ekwochi *et al*, 2014). In another study conducted among Nigerian parents of children visiting a clinic with sore-throat, more than half of the parents said they would request an antibiotic with as much as 42.2% of them saying they wouldn't be satisfied if the doctor refused their request (Sadoh, *et al*, 2015).

In both urban and rural Nigeria as well as Africa, very little is still known regarding parents' knowledge and/or attitudes on antibiotic use in URTIs in children. This study hopes to provide health professionals, stake holders, and policy makers in the health sector with evidence to produce effective educational strategies that would reduce this steadily growing menace of global reach. Therefore this study set out to achieve the following objectives; (1) to evaluate the parental level of knowledge of, attitudes to and practices towards antibiotics use for the treatment of URTI in children and (2) identify factors that could influence parental knowledge and attitudes towards antibiotic use in URTI.

MATERIALS AND METHODS

Study Design and Timeline: This study was a prospective observational survey and it was conducted between September and October 2018 in Enugu State, Nigeria. It included two cross-sectional comparative studies conducted in two hospitals; one in a rural setting and the other in the urban cosmopolitan part of the state.

Study setting: General Hospital, Nsukka (GHN) is a secondary facility that caters for the largely rural population of Nsukka, a suburb located in the Northern region of Enugu State, Nigeria. The hospital has 30 beds with 4 doctors, 2 pharmacists, and over 10 full-time nurses.

Enugu State University of Science and Technology University Teaching Hospital (ESUTH) is a tertiary hospital in the capital city of Enugu, Nigeria. It is the only state-owned tertiary hospital that serves the entire state. The hospital has 300 beds and 15 specialist clinics. The health professional workforce is estimated at about 200 doctors. Over 1000 nurses and 45 pharmacists.

Study Population and sample: Parents or caregivers of sick children aged 6 months to 12 years visiting the pediatric clinics of the two hospitals were selected to participate in this study. Both hospitals cater for different numbers of patients with the ESUTH seeing nearly three times more pediatric patients weekly, and parents were recruited for the study over a four-week period simultaneously in both hospitals.

Data Collection, instrument, and analysis: The study instrument employed in this study was an adaptation of questionnaires obtained from two previous studies (Panagakou *et al*, 2009; Yu *et al*, 2014). After approval was obtained, a pilot study was conducted with twenty parents from both hospitals. No changes were made to the questionnaire. A final twenty-four items and 2-page questionnaire was generated. The questionnaire included four sections which collected information on participant's demographic details, knowledge of bacterial infections and antibiotics, attitudes towards antibiotics use and antibiotics self-medication practices. The knowledge section of the questionnaire consisted of 11 items with a 3 response scale (no/yes/no idea). The section evaluating attitudes towards antibiotics use in URTI consisted of 9 items and adopted a 5-point Likert agree/disagree scale. The final section contained 4 items evaluating self-medication practices and physician's role in the prescription of antibiotics to children with URTI.

Returned questionnaires were proof-read, coded, categorized and transferred into the SPSS version 22 (Chicago, USA). Items assessing parents' knowledge of antibiotics were entered as correct response = 1 and incorrect response = 0 (the response "no idea" was taken as an incorrect response). A score of antibiotic knowledge (maximum score of 11 and minimum score of 0) was created for each parent. A parent total knowledge score of less than or equal to 6 (the median score) was adjudged "low knowledge" and higher than 6 as "high knowledge". Differences in the level of knowledge among different demographic groups were analyzed using the chi-square ($\chi 2$) test.

Items measuring attitudes of parents towards antibiotics use in URI were entered as strongly disagree =1 to strongly agree=5. Six of the nine statements were negatively worded and responses to them were reversed to reflect better attitudes. A mean score for all parents for each statement was generated and score within 0 to 3.0 were considered "unfavorable attitude" and scores within 3.01 to 5.0 were considered "favorable attitude". Differences in the level of attitudes among different demographic groups were analyzed using the student t-test and ANOVA.

Lastly, the association between parents' demographic details, level of knowledge and attitudes were also analyzed using the multiple logistic regressions. Any p-value less than or equal to 0.05 (two-tailed) indicated a significant statistical differences.

Ethics Approval : Ethical approval was obtained from the Ethics and Research Committee of the ESUTH (Ref no: ESUTHP/C-MAC/EC/0134/051). Also, verbal consent was obtained from each parent.

RESULTS

Participation rates and respondents' characteristics: A total of 1,100 parents were approached in both hospitals (650 in ESUTH and 450 in GHN) and 700 of the consenting parents returned a completed questionnaire suitable for analysis. This represented an overall response rate of 63.6% and hospital response rate of 58% (377/650) for ESUTH and 71.7% (323/450) for GHN.

There were significantly more female parents/caregivers (55.8%) and slightly more than half of the parents (51.1%) were aged between 31 and 40 years old. Six out of every ten parents (62% precisely) surveyed had more than three children in the family. More of the parents from the urban hospital comprised of females, of lesser age, had a higher education status, health insurance, less number of children and earned a better monthly income (all $p<0.05$). All other demographic characteristics of participants are summarized in Table 1.

When asked the general question *"Has any of your children suffered from a URI (e.g. cold, cough or catarrh) in the past 6 months?"* a high percentage of parents (82.7%, 579/700) acknowledged in the affirmative.

Parental knowledge of antibiotics use: About 41.4% of them correctly answered at least 7 questions out of the possible 11. An overall mean knowledge score of 5.71 (SD= 2.96) was produced for the parents in this study. In all but one knowledge item, a significantly higher percentage of parents from the urban hospital correctly answered the questions on antibiotics compared to the rural parents.

Half of the parents correctly answered the item "Upper Respiratory Infections is caused by viruses". For questions on the use of antibiotics, a third (33.3%) of the parents knew correctly that antibiotics were ineffective against infections caused by viruses. Moreover, 2 out of the 10 parents from the rural hospital correctly answered this question compared to 4 of 10 parents from the urban hospital. Also, as much as 4 in 10 parents incorrectly thought that giving a child an antibiotic in advance would protect the child from common cold (Table 2).

Table 1
Socio-Demographic Characteristics of Parent/Care Givers of Children from Surveyed Primary Hospitals in Enugu State, Nigeria

Variable	Urban Area	Rural Area	Total	p-value
		n (%)		
Total	**377 (53.9)**	**323 (46.1)**	**700 (100)**	
Gender				**0.011**
Male	151 (40.0)	158 (48.9)	309 (44.2)	
Female	226 (60.0)	165 (51.1)	391 (55.8)	
Age of parent *in years*				**<0.0001**
≤30	91 (24.1)	32 (9.9)	123 (17.6)	
31-40	212 (56.2)	146 (45.2)	358 (51.1)	
>40	74 (19.6)	145 (44.9)	219 (31.3)	
Education of parent				**<0.0001**
Primary school	12 (3.3)	50 (15.5)	62 (8.9)	
Secondary school	36 (9.5)	46 (14.3)	82 (11.7)	
University	329 (87.2)	227 (70.2)	556 (79.4)	
No of children				**<0.0001**
1-3	198 (52.4)	68 (21.2)	266 (38.0)	
4-6	165 (43.8)	207 (64.0)	372 (53.1)	
Over 6	14 (3.8)	48 (14.8)	62 (8.9)	
Enrolled for NHIS?				**<0.0001**
Yes	202 (53.6)	111 (34.4)	313 (44.7)	
No	175 (46.4)	212 (65.6)	387 (55.3)	
Monthly family income, *in Naira*				**<0.0001**
<50,000	44 (11.7)	139 (43.1)	183 (26.1)	
50,001-100,000	112 (29.7)	66 (20.4)	178 (25.4)	
100,001-150,000	150 (39.8)	35 (10.8)	185 (26.5)	
>150,000	71 (18.8)	83 (25.7)	154 (22.0)	

Table 2
Parents' Responses to Questions Related to Knowledge of Antibiotics and Their Use

Question	Correct response N (%)			*p*
	Total	**Urban**	**Rural**	
This URI (Upper Respiratory Infection) is caused by virus	388 (57.1)	241 (65.5)	147 (47.1)	**0.000**
Antibiotics should always be given when a child has cold, cough and catarrh	330 (47.8)	194 (51.9)	136 (42.9)	**0.011**
Antibiotics can cure infections caused by viruses	230 (33.3)	172 (46.0)	58 (18.3)	**0.000**
Antibiotics do not have side effects	460 (67.8)	243 (66.0)	217 (70.0)	0.154
Once a child has cough and/or running nose, giving him/her an antibiotic immediately will resolve all the symptoms	375 (54.3)	222 (59.5)	153 (48.1)	**0.002**
Giving more than one antibiotic works better than just one antibiotic only	365 (53.5)	212 (57.1)	153 (49.2)	**0.023**
Antibiotics should only be obtained with a doctors' prescription	532 (77.6)	288 (77.2)	244 (78.0)	0.445
Over using antibiotics may make them not work again	421 (62.0)	238 (64.0)	183 (59.6)	0.138
Taking antibiotics in advance can protect a child from common cold	384 (56.4)	222 (60.3)	162 (42.2)	**0.015**
The more expensive the antibiotics are, the more effective they are	462 (67.9)	266 (57.6)	196 (42.4)	**0.005**
Scientist can always produce new and better antibiotics	51 (7.4)	13 (3.5)	38 (12.1)	**0.000**

Analysis by chi-square test; p<0.05 shows statistical significance; Overall mean knowledge = 5.7 out of 11.0

Table 3
Parents' Level of Knowledge of Antibiotics by Socio-Demography and Knowledge Score

Socio-demographic variable	Low knowledge (≤ 8/11)	High knowledge (>9/11)	Total	*P*
Total	**410 (58.6)**	**290 (41.4)**	**700 (100)**	
Gender				
Male	174 (57.4)	129 (42.6)	303 (44.0)	0.756
Female	226 (58.7)	159 (55.2)	385 (56.0)	
Age of parent *in years*				
≤30	76 (68.5)	35 (31.5)	111 (18.0)	**0.027**
31-40	179 (56.6)	138 (43.5)	317 (51.5)	
>40	99 (52.9)	88 (47.1)	187 (30.4)	
Education of parent				
Primary/Secondary school	101 (80.2)	25 (19.8)	126 (21.7)	**0.000**
University	268 (58.9)	187 (41.1)	455 (78.3)	
No of children				
1-3	150 (57.5)	111 (42.5)	261 (38.2)	0.943
4-6	213 (58.8)	149 (41.2)	362 (53.0)	
Over 6	35 (58.3)	25 (41.7)	60 (8.8)	
Enrolled for NHIS?				
Yes	155 (65.7)	81 (34.3)	236 (43.9)	0.153
No	180 (59.6)	122 (40.4)	302 (56.1)	
Monthly family income, *in Naira*				
<100,000	214 (67.5)	103 (32.5)	317 (51.5)	**0.000**
>100,000	142 (47.5)	156 (52.3)	298 (48.5)	

p-value less than 0.05 are considered statistically significant

Table 4
Parents/Caregivers' Attitude towards The Use of Antibiotics

Attitude Item	Response N (%)					Mean±SD
	S Disagree	Disagree	Not Sure	Agree	S Agree	
I have little knowledge of bacterial resistance[R]	70 (10.3)	311 (45.7)	95 (14.0)	131 (19.3)	73 (10.7)	**2.74±1.19**
Most URTI are self cured and don't need antibiotics	68 (10.1)	153 (22.7)	160 (22.7)	227 (33.7)	66 (9.8)	**3.10±1.16**
Antibiotics are over-used in this country[R]	150 (22.2)	275 (40.7)	160 (23.7)	63 (9.3)	28 (4.1)	**2.32±1.04**
Parents need more information on the judicious use of antibiotics	19 (2.8)	25 (3.7)	17 (2.5)	350 (51.7)	266 (39.3)	**4.21±0.88**
I can personally decide which antibiotic my child should take[R]	37 (5.6)	113 (17.1)	141 (21.4)	207 (31.4)	162 (23.1)	**3.52±1.19**
Doctors should run tests before giving my child any antibiotic	39 (5.8)	49 (7.2)	152 (22.4)	256 (37.8)	182 (26.8)	**3.72±1.11**
When my child is sick, I prefer injection antibiotics to tablet antibiotics[R]	34 (5.0)	123 (18.1)	187 (27.5)	197 (29.0)	138 (20.3)	**3.41±1.14**
I prefer the more expensive antibiotics[R]	27 (4.0)	89 (13.1)	89 (13.1)	297 (43.9)	175 (25.8)	**3.74±1.10**
I prefer the newer antibiotics to older ones[R]	43 (6.3)	142 (20.9)	163 (23.9)	228 (33.5)	105 (15.4)	**3.31±1.14**

[R]Means that that particular item has been reversed during analyses and what is presented in the results table is the reversed form; SD=Standard deviation. Overall mean attitude score = 3.34

Older parents aged more than 30 years (p=0.027), parents with university education (p<0.0001) and parents with a higher earning status (p<0.0001) were significantly more knowledgeable about antibiotics than their corresponding counterparts. However, the gender of the parents, the number of children each of the parents had and a parent's enrollment in NHIS did not have an effect on the level of parental knowledge of antibiotics irrespective of the location of the hospital (Table 3).

Parental attitudes towards antibiotics use: Overall parents' attitude towards antibiotic use and misuse was marginally favorable (mean of 3.34 of 5.0 score). A high percentage of parents (91%) surveyed felt that they needed more information on the judicious use of antibiotics, bringing the mean attitude item score to 4.21. About 23% of the parents said they did prefer parenteral antibiotics to tablets. All attitude scores can be seen in Table 4.

Parents with university education possessed better attitudes towards antibiotics compared to parents with lower education status (3.40 vs. 3.22, p<0.001). Also, parents with high knowledge of antibiotics also tended to have better attitudes towards them compared with parents of low knowledge (3.48 vs. 3.24, p<0.0001) (Table 5).

Table 5
Parents' Attitude towards Antibiotic Use by Socio-Demography and Knowledge Score

Socio-demographic variable	Attitude Score N (%)		Mean	*P*
	Poor	Good		
Total	**452 (65.3)**	**240 (34.7)**	**3.34**	
Hospital Location				
Urban	254 (56.2)	120 (50.0)	3.31	
Rural	198 (43.8)	120 (50.0)	3.37	0.051
Gender				
Male	192 (43.2)	104 (43.9)	3.35	
Female	252 (56.8)	133 (56.1)	3.32	0.466
Age of parent *in years*				
≤30	66 (16.7)	43 (19.9)	3.30	
31-40	208 (52.7)	108 (50.0)	3.34	
>40	121 (30.6)	65 (30.1)	3.38	0.236
Education of parent				
Primary/Secondary school	90 (25.5)	34 (15.3)	3.22	
University	263 (74.5)	188 (84.7)	3.40	**0.000**
No of children				
1-3	178 (40.2)	81 (34.5)	3.31	
4-6	231 (52.1)	128 (54.5)	3.35	
Over 6	34 (7.7)	26 (11.1)	3.38	0.295
Enrolled for NHIS?				
Yes	136 (42.2)	100 (47.4)	3.41	
No	186 (57.8)	111 (52.6)	3.37	0.28
Monthly family income, *in Naira*				
<100,000	207 (50.9)	108 (52.7)	3.34	
>100,001	200 (49.1)	97 (47.3)	3.32	0.78
Antibiotic knowledge				
Low knowledge	294 (65.0)	109 (45.4)	3.24	
High knowledge	158 (35.0)	131 (54.6)	3.48	**0.000**

Attitude was rated as <3.5=poor; >3.5=good. Analysis by independent sample t-test of continuous (mean) data for 2 groups and ANOVA for three groups; p<0.05 is statistically significant

Factors affecting parental knowledge and attitudes towards antibiotics: For knowledge, parents over the age of 40 years were more likely to have a higher knowledge of antibiotics (OR=2.840, 95% CI: 1.237-6.523). Parents with an average of 4-6 children (OR=0.475, 95% CI: 0.283-0.800), those with university education (OR=2.001, 95% CI: 1.0.36-3.866) and those with high family income (OR=2.040, 95% CI: 1.268-3.282) were also significantly more likely to have high knowledge of antibiotics (Table 6).

Regarding attitude towards antibiotics, parents aged over 40 years (OR=0.387, 95% CI: 0.178-0.838), those with 4 to 6 children (OR= 2.048, 95% CI: 0.1.238-3.388) and those who had more knowledge about antibiotics (OR=3.208, 95% CI: 2.032-5.056) were also significantly more likely to exhibit favorable attitudes towards antibiotics use (Table 6).

Parental practices towards antibiotics: A majority (88.6%) of parents said they very often or occasionally gave their children antibiotics without any doctor's advice. Two out of 10 parents said the leftover antibiotics were used to treat their other children. The majority of the parents, 92.9%, said they had asked the doctor directly for an antibiotic and 84.3% claimed they had gotten an antibiotic from the doctors' prescription after they asked.

DISCUSSION

This research study of parents from two uniquely different hospital settings revealed that surveyed parents from both hospitals possessed poor knowledge of antibiotics, held marginally favorable attitudes towards antibiotics use and engaged in poor practices in their antibiotic use in their children having any form of URTIs.

Parents interviewed in this study showed considerably poor knowledge that could play an important role in inappropriate antibiotic use. Just about one-third of these parents knew that antibiotics could not cure diseases caused by viruses, though this figure was better than 21% of parents in China (Yu *et al*, 2014). This was however not the case in Europe, where a slightly higher percentage of parents, 46% knew the correct answer (Grigoryan *et al*, 2007). These figures could suggest a global trend of poor knowledge among caregivers of the function of antibiotics. Parimi and colleagues in 2004 reported that such a prevalent misconception had been the reason for antibiotic abuse due to self-treatment or over the counter demands at pharmacies and chemist shops in settings like Trinidad and Tobago.

Only about half the parents could rightly affirm that the URT infections highlighted were majorly caused by viruses. Though knowledge results from parents from the urban setting was significantly better than their rural counterparts, parents from both settings still need education on the sources and appropriate treatment for URTIs. Antibiotics knowledge reported from rural Malaysia was much lower than those from the rural hospital in this study (27% vs. 47%) (Chang and Tang, 2006). Over half of the parents (56%) thought giving a child an antibiotic in advance (as a prophylactic) could prevent the child from having a common cold, and this was also observed in the Italian study where about 63% the parents also reporting the effectiveness of antibiotics in URTIs (Vinker *et al*, 2003). Antibiotics have a defined role in URTIs which is not for prophylaxis but usually for acute rhino sinusitis lasting more than 10 days (Dowell *et al*, 1998). Various randomized control trials have shown the efficacy of oral zinc (Kurugol *et al*, 2006; Vakili *et al*, 2009), probiotics with *Lactobacillus* (Merenstein *et al*, 2010; Hojsak *et al*, 2010), and gargling with water (Satomura *et al*, 2005) have proven to be effective as prophylactics for common cold and not antibiotics.

Table 6.
Factors associated with parent's high knowledge and good attitudes towards antibiotics use in children with URTIs

Factors	Knowledge level		Attitude score	
	Adjusted OR	**95% CI**	**Adjusted OR**	**95% CI**
Urban hospital location	0.733	0.440-1.221	1.027	0.628-1.679
Male gender	0.698	0.418-1.164	0.708	0.674-1.787
Age of parent				
<30	Reference	Reference	Reference	Reference
31-40	1.796	0.907-3.554	0.562	0.302-1.045
<40	**2.840**	**1.237-6.523***	**0.387**	**0.178-0.838***
University education	**2.001**	**1.036-3.866***	1.755	0.952-3.235
Health insurance	0.643	0.402-1.027	1.295	0.828-2.024
No of children				
1-3 children	Reference	Reference	Reference	Reference
4-6 children	**0.475**	**0.283-0.800****	**2.048**	**1.238-3.388****
Over 6 children	0.568	0.233-1.385	2.091	0.895-4.884
Monthly family income, 100,000*N* and above	**2.040**	**1.268-3.282****	1.006	0.632-1.601
High antibiotic knowledge	NA	NA	**3.208**	**2.032-5.056****
Good antibiotic attitudes	**0.309**	**0.196-0.489****	NA	NA

*P<0.05 and **P<0.01; NA = not applicable; *N*, naira is equivalent to 0.005USD

Parents with higher educational degrees, from the urban hospital, and higher income status in this study possessed better knowledge of antibiotics, just as parents of some other settings (Yu *et al*, 2014; Parimi *et al*, 2004). This is expected as highly educated parents would be most likely dwelling in urban areas of the country. In order to improve the knowledge of antibiotics and its resistance in the rural settings, continuous education, and training of health workers in the rural setting on antibiotic resistance has been recommended by Ahebwa and colleagues (2017), who in turn educate their patients and the immediate public, could prove to be effective.

Overall, the general attitudes towards antibiotic use and misuse in this study were marginally good. A majority of the parents surveyed were willing and eager to receive more information on the judicious use of antibiotics, possibly acknowledging their inadequate knowledge. Also rightly, more than half of the parents thought that physicians should order tests before prescribing antibiotics to their children. Some physicians easily fall under pressures from parents to jettison the burden of having to run a test either because of cost, time for results to return or inconveniences it may cause. This disturbing trend has also been reported in other studies where physicians balked under parental pressure to prescribe an antibiotic when they really didn't need to (Cole 2014; Fletcher-Lartey *et al*, 2016).

It was also observed that a considerable number of parents either prefer parenteral and more expensive antibiotics to tablets and less expensive antibiotics. Physicians, as well as other direct health care providers, should make such caregivers aware that cost of an antibiotic does not confer "higher efficacy" to it, but other factors including the individual patient's profile, the occurrence of side effects and route of administration play more important role during prescribing of antibiotics (Simeons, 2011). Nearly all antibiotics, even parenteral antibiotics are purchased without prescriptions in most chemist shops and some pharmacies in major parts of Nigeria. This unrestricted access to these "vulnerable" medicines is a major contributing factor in the emergence of resistant "superbugs" (Goff and File, 2016). Despite poor attitudes in some items, over 90% of the parents were interested in getting more information on antibiotics. Direct patient education can comprise the use of pre-physician consultation talks, the use of drug leaflets and readable charts and the use of mass media. Experts have proposed for simple education on antibiotic stewardship practices especially in resource-limited settings where misuse and overuse of antibiotics need to be reduced (Goff *et al*, 2012).

The antibiotic knowledge of parents suggests its influence on their favorable attitudes towards the use of antibiotics. Such results had prompted countries such as Britain and Holland to focus on public education aimed at changing the irrational use of antibiotics in order to curtail the development of resistance to antibiotics (Davey *et al*, 2002; Stille *et al*, 2008). Other factors such as hospital location, gender and age of the parent, number of children and monthly economic status did not affect the type of attitude exhibited by parents towards antibiotics use and misuse.

Antibiotics self-prescribing practices exhibited by these parents in this study (as much as 8 in 10 parents) were much worse than those reported in other countries such as Greece (10%) and rural China (62%) (Panagakou *et al*, 2011; Yu *et al*, 2014). However, a similar percentage of parents in Trinidad and Tobago (84%) directly self-medicated their children with antibiotics without a doctor's consent (Parimi *et al*, 2004). This prevalent poor practice needs to be curtailed and the Ministry of Health in Nigeria needs to stiffen the regulations on the over-the-counter purchase of antibiotics. Antibiotic use in dispensaries such as pharmacies or medicine vendors needs to be seriously controlled and measures such as delayed prescribing encouraged.

The use of leftover antibiotics for treating URTIs in their children was common among parents surveyed. This could suggest that the first treatment was abruptly stopped (an under-dose due to non-completion) and the second child treated was probably given the leftover medicines only (another under-dose). This practice of use of leftover

antibiotics to treat URTIs in children was also reported among parents in rural Malaysia with 26% of them not completing the course of antibiotic treatment and 15% of them using leftover antibiotics to treat other children (Chang and Tang, 2006). Both practices could be major contributors to the resistance to antibiotics and deserve attention during the education of parents and the public on proper antibiotic use.

The study had some limitations. Responses from parents could have been biased as they could have provided information that would make them seem to be good parents when actually they did the opposite. We, however, believe the promise of anonymity would reduce such bias. Also, this study cannot conclude on the cause of poor knowledge and attitudes as it was cross-sectional and not repeated longitudinally.

In conclusion, parents surveyed in these two hospitals possessed poor knowledge of and marginally good attitudes towards antibiotic use in their children having URTIs and exhibited poor practices when utilizing them. The study identified some factors that were associated with poor knowledge and good attitudes towards antibiotics reported among these parents. This emphasizes the need to take the antibiotic stewardship campaign to the public and not just restricted to the hospitals. Simple antibiotic stewardship practices can be taught to parents during hospital visits or in their communities and homes. This study opens up further discuss and research into antibiotics prescribing practices of health professionals and the need for implementation of antibiotic stewardship practices in hospitals.

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