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## Original Research Article

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# Prevalence and pattern of antibiotics use among residents of Ilorin metropolis in north central Nigeria

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## Abstract

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**Purpose:** Prevalence of inappropriate use of antibiotics is a common practice all over the world. In the face of current global economic downturn, a large number of countries are facing serious health challenges, with people finding it difficult to meet their health needs. The objective of this study was to assess the prevalence and pattern of antibiotic use among the residents of Ilorin.

**Methods:** The study was a cross sectional study with a-14 item questionnaire to assess the pattern of use of antibiotics among residents of Ilorin. A total of 350 interviewer administered questionnaires were used for the study. Data obtained include demographic, knowledge and pattern of antibiotic use. The data obtained were entered into SPSS version 16 and analyzed and results were presented descriptively in the texts, tables and charts. Chi square was used as inferential statistics for categorical variables using cross tabulation of results to determine level of significance. P-value < 0.05 was considered significant.

**Results:** The prevalence of antibiotic misuse was 85.6%. The most commonly misused antibiotic was ampicillin-cloxacillin (49%) followed by metronidazole (45.1%) and tetracycline (38.0%). The most common ailments for self-medication were skin disease (59.1%), diarrhea / dysentery (52.1%) and cough. There was significant relationship between level of education and knowledge of antibiotics ( $p=0.001$ ). Level of education was also significantly associated with their knowledge of whether antibiotic should be used based on prescription or not ( $p=0.009$ ). However, respondents' gender did not influence their use of antibiotics without prescriptions ( $p=0.66$ ).

**Conclusion:** The prevalence of misuse of antibiotics in Ilorin metropolis was high and cut across all adults, gender and educational level. Ampicillin/cloxacillin, tetracycline and metronidazole were the leading antibiotics misused by the residents in the study area.

**Keywords:** Prevalence, antibiotics, inappropriate use, health challenges.

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**Indexing:** Index Copernicus, African Index Medicus

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## Introduction

The need to take medication appropriately is essential in achieving optimum benefit in medication use since medicines are pivotal to healthcare delivery and disease prevention [1]. Since drug therapy is a very important aspect of healthcare management, if drugs are inappropriately used, there will be a considerable effect on overall outcome of the health of an individual member of a community or whole

community with attendant health, social and economic implications [2].

Antimicrobial agents are the most commonly used and misused of all drugs. It has been reported that antimicrobials had been misused for decades; only 25% of the patients with respiratory illnesses had any bacterial aetiology and that about 52% of all the antibiotic prescriptions for respiratory illnesses were not clinically indicated at all. As a result,

antimicrobial resistance and therapeutic costs have increased significantly [3].

The United States Center for Disease Control and Prevention (US/CDC) [4] revealed that some clinicians in similar hospital units prescribe triple the amounts, with some making the types of errors that fuel drug-resistance problems that put many more patients at risk.

Irrational use of antibiotics through self-medication tends to carry more significance in the developing world where a wide range of antibiotics are available on the market and acquiring drugs over the counter is a very common practice [5].

In Nigeria, there are limited controls on the sale or advertisement of antimicrobials, creating opportunities for misinformation and misperceptions that can exacerbate improper antibiotic use [6]. In addition, access to good and effective medical interventions is often limited due to poor hospital facilities; service fees; poverty and hunger; and illiteracy. Patronage of “quacks”, untrained individuals providing unconventional and unhygienic medical care, is therefore widespread and frequently becomes institutionalized as normal [7].

The practice of self-medication has long been in existence world-wide, and the situation continues to increase particularly in developing countries where high prevalence had been reported. Misuse of drug is a product of self-medication since most misused drugs are those that are freely available uncontrolled and without restriction of use [8]. Antibiotics are chemical substances produced by microorganisms which have the capacity, in dilute solutions to inhibit the growth of or to kill other microorganisms. Those that inhibit growth of microorganisms are said to be bacteriostatic and those that kill microorganisms are said to be bactericidal. Resistance to antibiotics has been identified as a common therapeutic problem in the world at large [9].

One of the major causes of this resistance is the misuse of antibiotics which could result from inappropriate self-medication by patients. Various drug prescription problems have been identified in health facilities in developing countries like Nigeria. This includes

irrational use of drugs, unnecessary polypharmacy and high use of drugs with unproven efficacy. Some of these studies have shown that antibiotics are one of the most commonly prescribed drugs among physicians and have identified its overuse [10,11,12].

Suboptimal care has been identified as a major implication of inappropriate prescribing and the inclusion of pharmacists as part of a multidisciplinary team can assist in appropriate prescribing, as well as in the implementation of standard operating procedures and evidence-based guidelines to be used in the patient care [13].

Inability of the public to seek advice on drug use and understanding basic instructional materials has also been identified as some of the factors responsible for indiscriminate use of drugs in which antibiotics are not an exception. This is born out of the fact that the community does not differentiate between a quack and an expert on health issues. They always assume that anybody that offers medicines for sale could always be trusted and assumed as qualified to operate in Nigeria [10].

Efforts by the United States Centre for Disease Control have resulted in fewer children receiving unnecessary antibiotics in recent years, but inappropriate use remains a problem. Widespread overuse and inappropriate use of antibiotics continues to fuel an increase in antibiotic-resistant bacteria. Antibiotic resistance is also an economic burden on the entire healthcare system. Resistant infections cost more to treat and can prolong healthcare use [4].

The behaviours associated with the inappropriate use of antibiotics may include antibiotics self-medication and over-the-counter medication [14]. Self-medication with antibiotics that are available over-the-counter (OTC) is a common practice in China. The self-reported self-medication with antibiotics rates of outpatients varies from 28.7% to 62.5%, with 59.4% in children (by parents) and youths and 44.8% in general population. Even higher rates (35.0% to 90.4%) of self-medication with antibiotics have been reported in Chinese university students. Identified risk factors for misuse were higher education level, younger age, and better social and economic background [15].

Being more educated and more knowledgeable about antibiotics was independently associated with taking antibiotics without physician's consultation and keeping left-over antibiotics. Therefore, educational campaigns and 'do not recycle antibiotics' message, should focus on young adults who were more likely to store and take antibiotics without prescription. Additionally, physicians should shorten the course of antibiotics prescribed to 3 or 5 days. Successful implementation of International antibiotic regulations can be supported by urging pharmacists to dispense antibiotics according to the number of days stated by the physician and not in set pack sizes [16].

## Methods

### Study setting

Ilorin metropolis is made up of three Local Government Areas (LGAs) namely: Ilorin West, Ilorin East and Ilorin South. It is bounded in the north by Moro Local Government Area, South by Ifelodun Local Government Area and West by Asa Local Government area. The area land mass is about 54 square kilometers located between latitude 8° 10' and latitude 4° 35'. It is located in the transition zone between northern and southern parts of the Nigeria. The population figure of the study area according to 2006 population census was 777, 667 with Ilorin West; 364,666, Ilorin South; 208,691 and Ilorin East; 204,310 [17].

The area has one tertiary health facility, University of Ilorin Teaching Hospital, two secondary general hospitals and a host of primary healthcare centers. The metropolis also has a number of wholesale and retail pharmacies distributed across the three local governments but more concentrated in Ilorin West local Government Area which hosts the old city. Many outlets of patent medicine stores are visible within the main city and other settlements across the three LGAs.

### Study design

The study was a cross sectional survey of the residents of Ilorin to assess the pattern of use of antibiotics.

Fischer's formula was employed to determine the number of residents required for the study [18]. Based on a study population greater than 10, 000, a standard normal deviate (Z) of 1.96

and degree of accuracy (d), set at 0.05, a sample size of 355 was obtained.

Adults, male and female who were 18 years and above and consented to participate were included in the study. They should also be resident in the study area. Children and adults below the age of 18 and those who did not consent were excluded.

Pretesting of the questionnaire was done among 35 respondents (10%) in Afon, Asa Local Government Area, and a neighboring town. This was to ensure validity and reliability questionnaire.

Systematic random sampling was used to collect information from residents. One from every twenty households having resident that meet the inclusion criteria was selected in the study area. This was done until a total of 355 respondents were obtained. Only one resident was selected per house hold. The index house was determined by Grid method.

Data collection was done by trained research assistants who were closely monitored for compliance with the method of administering the questionnaires through self-administration or by interviewing the respondents.

The data information obtained from questionnaires and prescription sheets were separately entered into Statistical Package for Social Science (SPSS) version 16 and analyzed and the results were presented in descriptive manner. P-value less than 0.05 were considered significant for statistical tests.

## Results

A total of 355 questionnaires were administered to residents in the study area out of which 350 were valid for use (98.6%). Table 3.1 shows the socio demographics of the respondents. The mean age was  $32.8 \pm 10.99$  years. The minimum and maximum age was 18 and 80 years respectively. All the respondents were seen to have used antibiotics at one point in time with or without a medical prescription. The category found to use antibiotics without medical prescription was the concern of this study and they accounted for 299.6 (85.6%) of the studied residents.

Respondents reason for self-medication with antibiotics include dysentery/ diarrhea (97;

27.7%), cough (147; 42.0%), skin diseases in the form of boil, pimples, rashes, eczema, whitlow and burn (194; 59.1%), abdominal diseases like typhoid, stomach pain, peptic ulcer, dysentery/diarrhea conditions (187; 52.1%). Other conditions claimed to be associated with respondents' reasons for antibiotic use were sore throat (6; 1.7%), pile (2; 0.6%) and urinary tract infections (5; 1.5%), (Table 1).

**Table 1:** Demographic characteristics of the of respondents

Variable	Options	Frequency (%) n=350
Age (yr)	18-25	122(34.8)
	26-35	105(30.0)
	36-45	93(26.6)
	46-55	23(6.6)
	56-65	2(0.6)
	Above 65	5(1.4)
Gender	Male	159(45.4)
	Female	158(45.1)
Religion	Islam	190(54.3)
	Christianity	160(45.7)
Occupation	Civil servant	131(37.4)
	Trader	84(24.0)
	Artisan	46(13.1)
	Unemployed	9(2.6)
	Students	80(22.9)
Educational Status	Primary	7(2.0)
	Secondary	86(24.6)
	Tertiary	236(67.4)
	Non-formal	21(6.0)

The assessment of knowledge of respondents on the use of antibiotics indicated that majority of them (235, 67%) knew what an antibiotic was used for while only 2% of them believed that antibiotic could be used whether somebody was sick or not. Some of them even assumed that they could be used for the treatment of malaria (Table 2).

Two hundred and ninety seven (84.9%) respondents claimed they seek advice before taking an antibiotic while 52 (15.1%) did not. Some of the reasons given by those who don't normally care to seek further advice before taking antibiotics i.e 52(15.1%), were that they understood the instruction on the labels and packs 6 (1.8%), 18 (5.1%) based their reason on previous use of the drug while 15(4.2%) of the respondents claimed to have some knowledge of medication use and 12 (3.6%) of the respondents could not give any reason.

Out of 98(28%) users who claimed to experience side effects when using antibiotics, high percentage of them (30%) experienced nausea and/ or vomiting followed by abdominal pain; 21.4% while the least experienced side effect was belching (Figure 1).

Two hundred and sixteen (61.7%) responded to the question about the duration of use of antibiotics. Five respondents (1.4%) normally took their antibiotics for only one day while twenty three (23%), seventy two (20.6) and twenty five (7.1%) use antibiotics for two, three and four days respectively. Seven (2%) did not give any response.

Seventy three (20.9%) expressed that they have experienced side effect(s) at one time or the other when they took antibiotics while two hundred and thirty (66.3%) claimed they had not experienced any side effects.

The repeated exposure to antibiotic use without medical prescription was frequent among 125 (37.2%), less frequent among 205 (58.3%) while 20 (4.5%) were not consistent in antibiotic use.

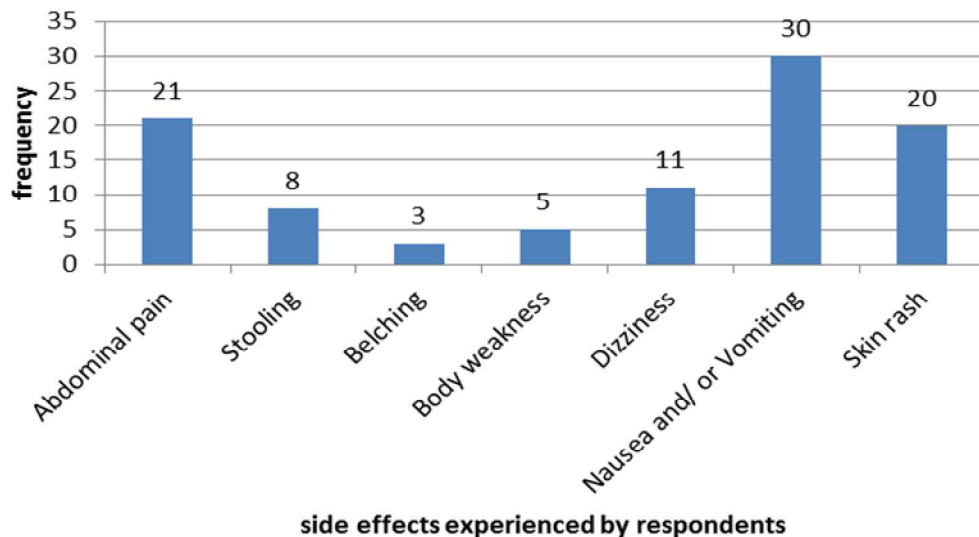
Relationship between educational status of respondents and knowledge of definition of antibiotics was determined using Chi square test. P-value obtained was 0.001, less than 0.05 indicating a strong relationship between educational level of respondents and their knowledge of what antibiotics are through their ability to define antibiotics. This means that those with higher level of education like tertiary and secondary were able to define antibiotics better than those with lower level of education.

When the association between level of education of the respondents and knowledge of whether antibiotics should be prescribed before use was assessed the p-value was found to be 0.009 indication that there was significant relationship between the level of education and the knowledge of whether antibiotics should be prescribed by a qualified health care practitioner or not. Hence, the higher their level of education the the better they are aware that antibiotics should be prescribed before use.

Also on assessing the relationship between gender of the respondents and awareness of whether antibiotics should be prescribed before use or not, the p-value obtained with chi square test was 0.66 indicating no significant association between the categorical variable. The

**Table 2:** Respondents' knowledge of antibiotics use

Variable	Frequency(%); n=350
Medicines that are used to treat any type of diseases	58 (16.6)
Medicines that can be used whether somebody is sick or not	7 (2.0)
Medicines that can be used to treat infections	235 (67.1)
Medicines that should be used only when prescribed by a medical practitioner	51 (14.6)
Medicines used to treat malaria	4(1.1)

**Figure 1:** Side effects experienced by respondents on antibiotic use**Table 3:** List of Antibiotics used by the respondents without medical prescription

Antibiotics	Frequency (%)
Ampicillin	66(18.9)
Ampiclox	174(49.7)
Amoxycillin	57(16.3)
Tetracycline	133(38.8)
Rifampicin	19(5.4)
Doxycycline	28(8.0)
Co-trimoxazole	128(36.6)
Metronidazole	158(45.1)
Ciprofloxacin	70(20.0)
Griseofulvin	38(10.9)
Chloramphenicol	45(12.9)
Erythromycin	8(2.3)

knowledge remains the same whether male of female respondent.

## Discussion

The demographic distribution of the study cut across the general population in terms of gender, occupation, educational status and age of eighteen and above [19]. There was higher number of female than male. This was slightly different from a study carried out in an urban

slum, Lekki in Lagos which had more number of men than women [5].

The prevalence of antibiotic use without medical prescription among the residents of Ilorin was high. The pattern was similar in both male and female and high among middle age group. This trend may lead to avoidable bacteria resistance to the antibiotics in question. Antibiotics are not to be used indiscriminately. It requires guidance and prescription by expert for it to be efficacious. At the same time, indiscriminate use of this group of drugs may give rise to strains of bacteria that may be difficult to eradicate with common antibiotics.

Respondents knowledge of antibiotics was high as two third of them could define an antibiotic correctly. This may be linked with the educational status of the respondents which revealed that most of them had post-secondary school qualification. There was significant association between their level of education and knowledge of antibiotics. Those with tertiary education had the highest number of respondents who had knowledge of antibiotics compared with those with lower educational qualification.

Also, there was significant association between respondents' educational status and knowledge of whether or not antibiotic should be prescribed before use. This was consistent with a study which identified higher level of education as a risk factor for self-medication [15].

The most common ailment prompting antibiotic use without medical consultation was skin diseases like boil, eczema, wound, pimples, burns, and whitlow and skin rash. Some of these common skin diseases have been identified as disorders related to lack of personal hygiene including urinary tract infections [20]. Other diseases that closely followed were gastrointestinal diseases like dysentery/ diarrhea, stomach pain, ulcer and "typhoid" and cough. This is contrary to a study carried out in Ahmadabad, India, which identified fever as the leading cause of antibiotic misuse [21] but consistent with a Chinese finding among university students which ranked cough as the third reason [15].

Although, majority of the respondents claimed they seek advice of a medical practitioner before taking an antibiotic, their response did not support this claim as majority of them were unaware that antibiotics should be used only when prescribed they indirectly used antibiotics without prescription which corresponds to prevalent rate of antibiotic misuse in this study area. However, this value was lower than the one obtained in Lagos with nonprescription use of antibiotics stood at 91.6% [5].

Comparative prevalent rate in general self-medication include 76% in Pakistan [22] and 45% in Iran [22,23] Some other studies on self-medication with antibiotics and reported prevalence rates of 74% in Sudan [24], 78% in Greece [25], 46% in Jordan [26], 3% in Denmark [27], 11% in Spain [28], 19% in Malta [29] and 22% in Lithuania [30] have been documented.

Evidence from the various studies indicate that self-medication appears to be relatively higher in the developing world compared to the developed countries. Factors that may be responsible for this could not be far from the fact that the metropolis is central in drug distribution system which neighboring cities patronize for their supplies. Also the widespread unregulated patent medicine vendors which increase access to

medication are also a critical factor. Another reason could be the domination of drug market in the metropolis by unofficially trained individual could reasonably contribute to sources and presumptive information about medication use.

The reason given by majority of those that responded not to seek advice on antibiotic use was that they had previous use of the drug. This result is consistent with a study carried out among university students in Southern China which identified prior Knowledge of antibiotics as a risk factor from antibiotic misuse due to false sense of confidence in self-diagnosing and self-management [15].

Only a fraction of the respondents responded in affirmative that they experienced side effects from use of antibiotics. Nausea and/ or vomiting and skin rash were the leading side effects they experienced while only a few of them experienced diarrhea, weakness, and belching. These were common side effects that have been known to be associated with antibiotic use.

More than one third of the respondents accepted repeated exposure antibiotics without medical prescription and majority of them to use for not less than five days. More than half of them were less frequent in their exposure.

The most commonly misused antibiotic was ampiclox (ampicillin-cloxacillin). The possible reasons for this could be its affordability and ready availability. Ampiclox was also found to be the most commonly misused among users in Lagos according to a study carried out among Lekki residents where 79.2% of the participants misused the drug [5]. This was contrary to a result obtained in Indonesia where Amoxicillin was the most popularly misused antibiotic with 77% prevalence rate besides ampicillin, tetracycline, and ciprofloxacin [31] High level of metronidazole and tetracycline use could be as a result of diarrhea and/ or dysentery which respondents claimed was one of the reasons they took antibiotics without medical recommendation.

## Conclusion

There is high prevalence of antibiotic misuse among the residents of Ilorin. This misuse cuts across gender and age groups. Higher

educational level was associated with better knowledge of antibiotics and attitude to freely use antibiotics. Ampicillin/cloxacillin, tetracycline and metronidazole were the leading antibiotics misused by the residents in the study area

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## Conflict of interest

The authors declare no conflict of interest in this work

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