

**KNOWLEDGE, ATTITUDE AND PRACTICE TOWARDS ANTIBIOTICS USE
AMONG NON-MEDICAL UNIVERSITY STUDENTS IN UYO, NIGERIA**

Abstract

Background: The widespread use, misuse and overuse of antibiotics in human and veterinary medicine have resulted in emergence and spread of antibiotics resistance consequently decreasing their effectiveness and efficacy. Recent studies consistently reveal that university students have limited knowledge and widely misuse antibiotics thereby increasing the spread and problem of resistance. This study aims to obtain baseline information on the knowledge, attitude and practice towards antibiotics use and resistance among university students in Uyo, Nigeria. **Method:** A cross-sectional questionnaire based study of the knowledge of, attitude and perception to antibiotics use and resistance was conducted among convenience sample of non-medical students attending one of the major universities in Uyo, South-South of Nigeria for a period of three months between April and June 2017. Descriptive and multivariate logistic regression was used in data analysis. **Results:** Out of the 335 questionnaire distributed, 15 were excluded for incomplete demographics and less than 80% filling (response rate, 95.5%). The knowledge assessment test shows poor knowledge of antibiotics use and resistance among two hundred and one non- medical students (62.8%) while one hundred and nineteen students (37.2%) had good knowledge. Year of study and age were significantly associated with knowledge of antibiotics use and resistance while there was no statistical relationship between gender and knowledge scores. More than half of the participants (51.9%) have taken antibiotics within the last six months while only 43.1% completed the last antibiotics prescribed to them. One hundred and eighty nine students have self-medicated in the past and more than one third of them were to treat cold and cough symptoms. **Conclusion:** This study substantiates that limited knowledge of antibiotic use and resistance exists among non-medical university students in Uyo, Nigeria. It also suggests a high level of antibiotics misuse in the form of non-adherence to prescribed dose of antibiotics and self-medication majorly for treating respiratory symptoms. Based on these findings, we recommend a sustained continuing medical education for healthcare workers and public health awareness campaigns. In addition, antibiotic sales should be strictly regulated in Nigeria to prevent their indiscriminate use of medicine.

Key words: Antibiotics, resistance, public health, non-medical university students, self-medication.

37 Introduction

38 Since the discovery of Antibiotics in the 1920s, it has been used successfully to treat deadly bacterial
39 infections for example, pneumonia and for preventing infections such as in surgical prophylaxis. They
40 are also increasingly used in animal husbandry for treating infections, for prophylaxis and for growth
41 promotion. Presently, antibiotics are one of the most commonly prescribed medicine in most
42 developing countries including Nigeria [1-3] In Nigeria, veterinary antimicrobial consumption is
43 expected to increase to 163% between 2010 and 2030 [4].

44 The widespread use, misuse and overuse of antibiotics in human and veterinary medicine have
45 resulted in emergence and spread of antibiotics resistance consequently decreasing its effectiveness
46 and efficacy. The emergence of antibiotics resistance is a major global health threat causing difficult
47 to treat infections, therapeutic failure, increased patient mortality and higher treatment cost and it has
48 been predicted that Nigeria is one of the countries at great risk of suffering these impacts [5]. Overuse
49 and misuse of antibiotics is often enhanced by access to antibiotics without a physician's prescription,
50 economic factor, lack of knowledge and the unregulated sales and consumption of antibiotics as over
51 the counter medicine in most low and medium income countries. This situation appears to be worse in
52 Nigeria where regulation concerning drug sales, distribution and supply are weak and almost non-
53 existent. In Nigeria, some of the existing laws and agencies responsible for the regulation and control
54 of drug manufacture, sales, distribution such as the National agency for food and drug administration
55 and control, NAFDAC and the Pharmacists council of Nigeria, PCN but they are far from adequate
56 [6]. NAFDAC is also mandated to regulate, control, monitor, and establish institutional
57 measures to ensure quality and safety of antimicrobials. Drug distribution in Nigeria is chaotic
58 and consists of several outlets of pharmacy shops, drug chemists, street hawkers and open drug
59 markets where people easily walk in and demand for an antibiotic without a physician's prescription
60 [6]. The widespread indiscriminate sales and use of antibiotic in Nigeria is often spurred by ignorance,
61 greed, high cost of drugs, corruption and weak enforcement of regulatory laws. Examples of misuse
62 of antibiotics include the use of antibiotics to treat non-bacterial infections such as cold, flu and non-
63 adherence to treatment regimens.

64 Recent studies consistently reveal limited knowledge of antibiotics and irrational use of antibiotics
65 among university students thus increasing the spread of antibiotics. In 2015, a study was conducted to
66 determine knowledge of antibiotic use and self-medication practices among non-medical university
67 students in Jordan [7]. More than half of the students could not accurately identify the uses of
68 antibiotics and have self-medicated in the past. Similarly, a study of antibiotics use among non-
69 medical Nigerian university students revealed gross misuse of antibiotics among the students where
70 about 72.3% did not adhere to treatment regimen [8].

71 Appropriate use of antibiotics in the society is enhanced by correct knowledge, positive beliefs and
72 attitude. Public health awareness and education on antibiotic use is crucial for the control of the
73 spread of antibiotics resistance because it builds understanding and changes social attitude. The World
74 Health Organization global action plan identified five strategies for control of antibiotics resistance
75 out of which includes increasing public awareness and understanding through effective public
76 communication and optimization of antibiotics use in humans [9]. It is important to have a primary
77 understanding of the knowledge, attitude and perception (KAP) towards antibiotics use among
78 different groups within a population such as university students in order to determine risk factors and
79 target interventions to suit specific needs. Furthermore, the need for this study is driven by the lack of
80 KAP studies on antibiotic use in Uyo, Nigeria. Thus, this study aims to obtain baseline information on
81 the knowledge, attitude and practice towards antibiotics use and resistance among university students
82 in Uyo metropolis.

83 **Method**

84 A cross-sectional questionnaire based study of the knowledge of, attitude and practices to antibiotics
85 use and resistance was conducted among convenience sample of non-medical students from **Faculties**
86 **of Arts, Business administration and Education at the University of Uyo. Uyo is the capital of Akwa**
87 **ibom state which has a poverty rate of 23.8% compared to the national average of 46.0% and it is**
88 **located at the south-south region of Nigeria.** The study was conducted for a period of three months
89 between April and June 2017. Participation was anonymous and voluntary where completion and
90 submission of the questionnaire was taken as consent to participate in the study. High level of
91 confidentiality was maintained throughout the study. Students were selected for the study if they were
92 not admitted into medical programs such as medicine, dentistry, pharmacy and nursing and **recruited**
93 **during one of their class sessions.** Before administering the questionnaire, the objective of the
94 questionnaire was explained and students were further encouraged to voluntarily participate in the
95 study. The pre-tested questionnaire was administered to students during regular class sessions and
96 submission was on the same day of administration.

97 Research instruments were self-administered questionnaires designed to get an overview of students'
98 knowledge of antibiotic use and resistance and obtain information on the attitude and practices of non-
99 medical university students regarding antibiotics usage. The questionnaire was developed after
100 comprehensive literature review of related studies [7, 8, 10, 11] and then modified to suit the local
101 context. The questionnaire was then pre-tested on 20 students and adjusted as appropriate so that the
102 questions were easy and simple to understand and answer while providing accurate information. The
103 22 points questionnaire comprises three sections. The first part explored socio-demographic data such
104 as age, gender and level of study. The second part consisted of eight questions which evaluated the

105 students' knowledge of key areas of antibiotics, identification, prudent use, indication and possible
 106 causes of resistance and based on 3 scale responses, yes, no and not sure. Lastly, the third part
 107 consisted of questions related to attitudes and practices towards antibiotics use such as source,
 108 adherence, self-medication and reason and consisted of both open and close-ended questions.

109 A questionnaire was considered valid if all demographics were filled and 80% of the questions
 110 completely answered. Data were entered and analysed using SPSS version 20 for windows to generate
 111 descriptive statistics. Descriptive statistics such as frequency, percentage were employed to analyse
 112 data. Chi square was also used to assess relationship between dependent and independent variables to
 113 establish statistical significance. A P value of <0.05 was considered as statistically significant. The
 114 Knowledge assessment was scored by assigning one mark to correct answer and zero to incorrect
 115 response. A score of <6 was considered poor knowledge while a score of ≥ 6 was taken as good
 116 knowledge. The scale measured knowledge at a score range of 0 to 8.

117 Ethical approval for this study was obtained from the Research ethics committee of the Faculty of
 118 Pharmacy, University of Uyo, Nigeria.

119

120 RESULTS

121 A total of 335 students participated in the study out of which 15 questionnaires were excluded due to
 122 incomplete and missing information giving a response rate of 95.5%. Out of the 320 included
 123 participants, 134 were males while 186 were females. Most respondents were within the age bracket
 124 of 15-25 years (82.5%). Table 1 describes the demographic characteristics of participants.

125 **Table 1:** Respondents demographic characteristics and their knowledge of antibiotics use

Demographics characteristics	Total (N=320)%	Poor knowledge (n = 201) %	Good knowledge (n=119) %	Chi Square	P value
Gender					
Male	134 (41.9)	96 (71.6)	38(28.4)	7.694	0.06
Female	186(58.1)	105 (56.4)	81 (43.5)		
Age					
15-24	237 (74%)	154 (65)	83 (35)	266.11	<0.0001
25-30	62(19.4%)	36 (58.1)	26 (41.9)		
31-40	21(6.7%)	11(52.3)	10 (47.6)		
Year of study					
1 st year	61(19.1%)	41(67.2)	20(32.8)	512.27	<0.0001
2 nd year	105 (32.8)	66 (62.9)	39(37.1)		
3 rd year	51 (15.9)	32(62.7)	19(37.3)		

4 th year	103 (32.2)	62(60.2)	41(39.8)		
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Percentage poor/good knowledge (%) = number of poor/good knowledge among selected category/
number of participants among the same category * 100. For instance; % poor knowledge among
males = 96/134 *100

The knowledge assessment test shows poor knowledge of antibiotics use and resistance among two hundred and one non-medical students (62.8%). Female students showed slightly higher knowledge than the male students although the difference was not statistically significant (Table 2). 71.6% of female respondents had poor knowledge of antibiotics compared 56.4% of the participating males. On the other hand, there is a high significant correlation between increasing age group and good knowledge of antibiotics ($p < 0.0001$). Participants in the age group of 31-40 had good knowledge of antibiotic usage (47.6%) than other age groups; 25-30(41.9%) and 15-24(35%). Similar association was observed among different levels of study where fourth year students had better knowledge of antibiotics use and resistance compared to other level of study.

Nearly all respondents (91.3%; 95% CI 88.2-94.4) claimed they know what antibiotics are. Table 3 presents the proportion of students who gave correct answers to questions on knowledge about antibiotics usage. While 86.3% of the participants answered correctly that antibiotics can kill bacteria, only 25% disagreed to the statement that ‘antibiotics can kill viruses.’ Less than one half of the participants correctly answered that antibiotics can kill useful bacteria that normally live on the skin and in the stomach (47.2%, 95%CI 41.7-52.7). Similarly, 47.1% were able to correctly answer that antibiotics treatment should always be completed. Confusion on the emergence of antibiotics resistance exists in this study. 59.4% of the students agreed that bacteria are becoming resistant, still only 36.5% correctly identified that unnecessary use of antibiotics can likely make it not to work. However, a higher proportion of students (82.5%) agreed that the more we use antibiotics, the more likely it will not work.

Table 2: Percentage of students who answered correctly to questions regarding knowledge about antibiotic use

Knowledge about antibiotic use	Number (n = 320)	Percentage (%)	95% CI
Do you know what antibiotics are?	292	91.3	88.2-94.4
Antibiotics can kill bacteria	276	86.3	82.5-90.1
Antibiotics can kill virus	80	25.0	20.3-29.7
Antibiotics can kill useful bacteria on the skin and stomach	151	47.2	41.7-52.7
Bacteria are becoming resistant to antibiotics	190	59.4	54.0-64.8

Unnecessary use of antibiotics can likely make it not to work	117	36.6	31.3-41.9
The more we use antibiotics, the more likely it will not work	264	82.5	78.3-86.7
Antibiotics treatment should always be completed	151	47.2	41.7-52.5

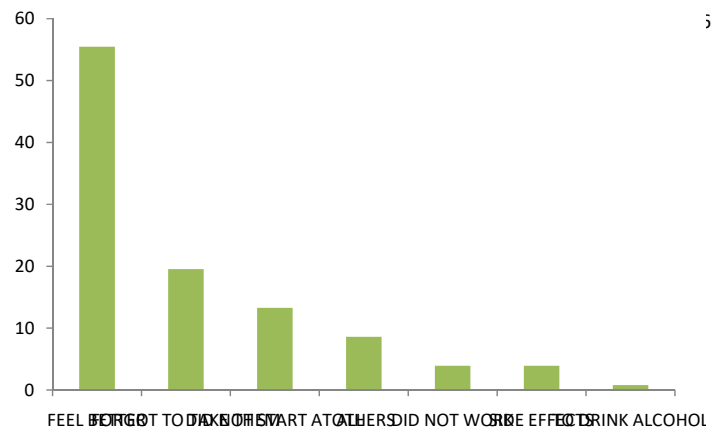
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152 Assessing the participant's attitude towards antibiotics use, more than half of the participants (51.9%)
 153 have taken antibiotics within the last six months while only 43.1% completed the last antibiotics
 154 prescribed to them. When asked the reason for not finishing the last antibiotics course prescribed,
 155 55.5% reported that it was because they felt better. 19.5% forgot to take them, 13.28% did not start
 156 the course at all while 3.91% reported that they did not work. 3.9% stopped their treatment because of
 157 side effects, 8.6% because of other reasons not listed while less than 1% did not finish their course in
 158 order to drink alcohol. Nearly two-thirds of the students (61.3%) agreed that they needed to see a
 159 doctor before taking an antibiotic however 43.8% expects the doctor to prescribe an antibiotic when
 160 they are down with common cold or cough.

161 **Table 3:** Attitudes to antibiotics usage

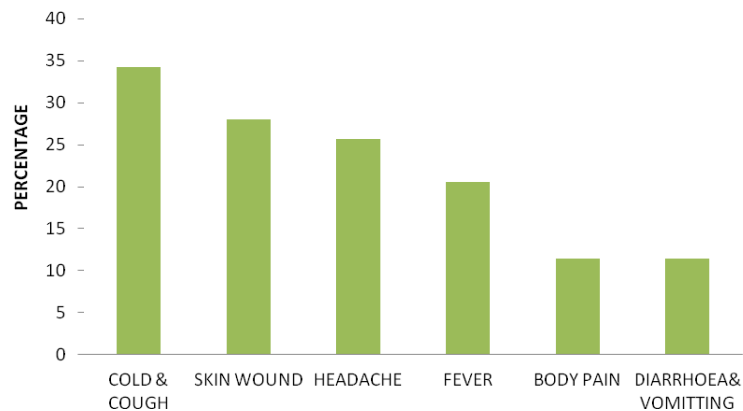
Attitude to antibiotics use	Yes n (%)	No n (%)	Unsure n (%)
Took antibiotics within the last six months	51.9	41.0	7.2
Completed the last antibiotics prescribed	43.1	40.0	17.2
I need to see a doctor before taking antibiotics	61.3	32.5	6.3
I expect my doctor to prescribe antibiotics for me when I am down with cold	43.8	42.8	13.4

162



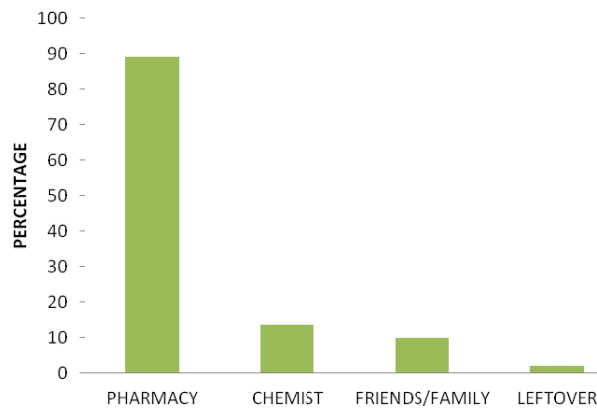
164 **Figure 1:** Reasons for not completing the dose of antibiotic

165 Pertaining to respondents practices towards antibiotics use, one hundred and eighty nine (59.1%)
166 students reported that they had taken an antibiotic prior to the study without a medical prescription or
167 consultation. Among those that practised self-medication, majority took ampiclox™, a fixed dose
168 combination of ampicillin and cloxacilin (76.5%); ampicillin (47.3%), amoxicillin (28.4%) and
169 ciprofloxacin (26.8%) while some mentioned anti-malarial as antibiotics (8.6%). Most of these
170 antibiotics were taken for cold and cough (34.3%) and 28% were taken in order to treat skin wounds.
171 Others reasons stated by participants for taking antibiotics without a doctor's advice are headache
172 (25.7%), fever (20.6%), body pain (11.4%) and diarrhoea and vomiting (11.4%). Figure 1 shows the
173 reasons for self-medicating among respondents. While analysing the source of antibiotics for self-
174 medication as shown in figure 2, the result showed that 89.1% of participants who practiced self-
175 medication obtained the antibiotics from private pharmacies, 13.7% were from patent medicine stores
176 (Chemists). Similarly 10% stated they received antibiotics from family and friends while only 2.1%
177 were from leftover antibiotics.



178

179 **Figure 2:** Symptoms associated with self medication



180

181 **Figure 3:** Sources of antibiotics for self- medication

182 Discussion

183 Antibiotics resistance is a growing menace and presents a significant public health problem
 184 worldwide. Presently, little is known about the knowledge of antibiotic use and resistance in Africa
 185 and in particular, Nigeria. This study presents vital data on the level of knowledge, behaviour and
 186 practices of non-medical students to antibiotics use and the health problem of antibiotics resistance in
 187 Uyo, Nigeria.

188 Overall, poor knowledge scores on antibiotic usage and resistance were reported among slightly more
 189 than two-third of the respondents indicating a high level of misunderstanding of antibiotics usage and
 190 resistance. The age and year of study were found to be major predictors of low knowledge among
 191 participants as indicated by their p value = <0.0001. Although majority of the respondents claimed
 192 they knew what antibiotics are, just few could answer accurately if antibiotics are effective against
 193 viruses. There is a general false belief that antibiotics can be used to treat all kinds of infections. This
 194 inadequate knowledge about the use of antibiotics correlates with findings from previous studies
 195 assessing the knowledge of undergraduate students from Nigeria [8, 12] and other countries [10].
 196 However, a slightly higher knowledge was reported in studies among students in the medical
 197 departments [13]. The present study also showed poor knowledge of the factors responsible for
 198 antibiotics resistance. Only, a small proportion of the participants agreed that unnecessary use of
 199 antibiotics can lead to resistance and that antibiotics treatment should be completed. These findings
 200 clearly show the need for a better explanation of the differences between bacteria and virus in future
 201 public health campaigns. Furthermore there is need for focused public education on antibiotics
 202 effectiveness and resistance in order to avoid misconceptions.

203

204 With regards to attitude to antibiotics use, 51.9% of the participants have taken antibiotics within the
205 past 6 months, however more than half of the students did not complete their treatment course as
206 prescribed or were not sure if they did. Most of them stopped because they felt better while some
207 forgot to take them. This negative attitude to antibiotic use can further worsen the emergence and
208 spread of antimicrobial resistance in Nigeria hence putting the patient at risk of relapse with resistant
209 bacteria. Furthermore, it is widely known that inappropriate use such as incomplete antibiotics therapy
210 can lead to the emergence of antibiotics resistance. In this study, majority (61.25%) of the students
211 agreed that they needed to consult a doctor before taking an antibiotic which is in agreement with
212 other studies. In contrast, a greater proportion of the participants expects the doctor to prescribe an
213 antibiotics when down with common cold. Patient's expectation and pressure are often the drivers for
214 antibiotic prescribing by physicians leading to unnecessary prescribing [14].

215

216 This present study reports that about one in two of the study population had self-medicated prior to
217 the study. This is similar to studies from Nigeria [15-17]. This practice is mostly enhanced by the ease
218 of purchase of antibiotics over the counter without a physician's prescription in Nigeria even though
219 antibiotics are by Nigerian law and regulation classified as prescription only Medicine. The sales of
220 medicines are under-regulated in Nigeria leading to a high incidence of self-medication practices in
221 the country and consequently adverse effects and antimicrobial resistance. Interestingly, most of the
222 antibiotics used by respondents are the penicillins such as ampicillin, amoxicillin and especially oral
223 penicillins (which are sensitive to β -lactamases) and ciprofloxacin, a fluoroquinolone. High incidence
224 of bacteria resistance to this class of medicines has been reported in the country [18-19]. This self-
225 medication practice might be the contributory factor to the rise in incidence rates of resistance
226 observed among penicillins and emerging reports of resistance among ciprofloxacin. Common cold,
227 cough and catarrh were the major symptoms that were treated with antibiotics without consultation of
228 a physician. This was followed by skin wounds and headaches. Private pharmacies were the major
229 source of antibiotics for self-medication. This result is in agreement to several Nigerian studies which
230 suggest that people obtain the medicines without consulting a physician mainly from community
231 pharmacies [12, 16]. Participants also purchased antibiotics from patent medicine stores (chemists)
232 operated by non-pharmacists while some received from friends and leftover antibiotics. In a bid to
233 maximise profit, antibiotics are often sold as over the counter without restrictions in Nigeria. This
234 dangerous practice can also worsen the spread and problem of antibiotic resistance.

235 To decrease indiscriminate use of antibiotics by the public, adequate awareness and education on the
236 appropriate uses of antibiotic and hazard of antibiotics misuse should be carried out. Patient
237 education can be achieved by individualized counselling, the use of pamphlets, workshops and
238 community wide education. Healthcare providers such as doctors and pharmacists play important role

239 in ensuring appropriate drug use, patient education and counselling. This study also highlights the
240 need for strong enforcement of regulatory policies on drug supply and distribution and the sale of
241 antibiotics in Nigeria.

242 **Study Limitations**

243 There are certain limitations which should be taken into account while interpreting the findings of this
244 study. They include the use of convenience sample of study participant which may be associated with
245 selection bias as some students may be missed or over-selected. Also, the use of self-administered
246 question has some limitations such as recall bias because it depends on the information provided by
247 respondents which may result in over reporting or under reporting.

248 **Conclusion**

249 This study substantiates that limited knowledge of antibiotic use and resistance exists among
250 university students in Uyo, Nigeria although majority were aware antibiotics are used to treat bacterial
251 infections. Furthermore, it suggests a high level of antibiotics misuse in the form of non-adherence to
252 prescribed dose of antibiotics and self-medication with antibiotics mainly to treat respiratory
253 symptoms. Therefore, sustained health education for health workers and public health awareness
254 strategies should be the key interventional method to improve behaviour and change perception. Also,
255 antibiotic sales should be strictly regulated to prevent indiscriminate use of medicine.

256

257

258 **COMPETING INTERESTS**

259

260 Authors have declared that no competing interests exist.

261

262

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318

319

320

321

322 ANTIBIOTICS_QUESTIONNAIRE

323 SECTION A

324 AGE:

325 15-24: [] 25-30: [] 31-40: [] 40 and above: []

326 GENDER:

327 MALE: []

328 FEMALE: []

329 YEAR OF STUDY:

330

331 SECTION B: KNOWLEDGE ABOUT ANTIBIOTICS USE

		YES	NO	NOT SURE
1.	Do you know what Antibiotics are?			
2	Can Antibiotics treat bacterial infection?			
3	Can antibiotics treat viral infections?			
4	Do you think that bacteria are becoming resistant to antibiotics?			
5	Do you think that unnecessary use of Antibiotics can likely make it not to work			
6	The more we use Antibiotics, the more likely it will not work			
7	Should antibiotics dose/treatment always be completed?			
8	Can antibiotics kill the useful bacteria on the skin and stomach?			

332

333 SECTION C. ATTITUDE TO ANTIBIOTICS USE

334 1. Have you ever been prescribed antibiotics in the last 6 months?

- 335 A. Yes []
 336 B. No []
 337 C. Not Sure []
 338
 339 2. Did you complete the **last** antibiotics prescribed to you?
 340 A. Yes []
 341 B. No []
 342 C. Not Sure []
 343 (Please skip 3 and answer 4, if your answer is YES in above question)
 344 3. If **NO**, what were your reasons? Because;
 345 A. You feel better []
 346 B. You forgot to take them []
 347 C. You did not start the drug at all []
 348 D. They did not work []
 349 E. To be able to drink alcohol []
 350 F. Side effect []
 351 Others (please specify):
 352 4. Do you think you need to see a doctor before taking an antibiotic?
 353 A. Yes []
 354 B. No []
 355 C. Not Sure []
 356
 357 5. Have you ever received antibiotics from relatives or friends without seeing a doctor?
 358 A. Yes []
 359 B. No []
 360 C. Not Sure []
 361
 362 6. Do you expect your doctor to prescribe antibiotics for you when you are down with cough
 363 and catarrh?
 364 A. Yes []
 365 B. No []
 366 C. Not Sure []
 367
 368 7. Have you ever taken antibiotics without being told to do so by a **doctor**?
 369 A. Yes []
 370 B. No []
 371 C. Not Sure []
 372
 373 8. If **YES**, which complaint did you use the antibiotics to treat without seeing a **doctor**?
 374 A. Headache []
 375 B. Fever []
 376 C. Cold, cough and Catarrh []
 377 D. Body Pain []
 378 E. Skin wound []
 379 F. Frequent stooling and vomiting []
 380
 381 9. Please write down the name(s) of antibiotics you have ever taken without seeing a doctor?
 382
 383 A.
 384 B.
 385 C.
 386 D.
 387

388 10. Where do you usually get your antibiotics without doctor's prescription?
389 A. Pharmacy []
390 B. Chemist Shop []
391 C. Street Hawkers []
392 D. Friends or Family []
393 E. Leftover antibiotics []
394 Others (Please specify):

395

396

397



DEPARTMENT OF PHARMACOLOGY & TOXICOLOGY

FACULTY OF PHARMACY

UNIVERSITY OF UYO

P.M.B. 1017 UYO, AKWA IBOM STATE

Our Ref:

Your Ref:

Date: August 22, 2017

TO WHOM IT MAY CONCERN

I write to inform you that the application of Pharm. (Mrs.) Asogwa, Ifunanya Evangeline which she made to the Faculty of Pharmacy Ethics Committee for the administration of questionnaires to non-medical students was successful.

Her work involved questionnaire based study on knowledge, attitude and practices towards antibiotics use among non-medical university students.

This work is neither deleterious to lower animals nor to humans.

On behalf of the committee, I therefore communicate to you on your successful application.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Paul A. Nwafor', is written over a circular purple stamp. The stamp contains the text 'DEPT. OF PHARMACOLOGY & TOXICOLOGY' and 'UNIVERSITY OF UYO' around a central emblem.

Prof. Paul A. Nwafor
Chairman, Ethics Committee