Knowledge, Attitude and Practice towards Antibiotics Use among Non-medical University Students in Uyo, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author IEA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author SJO revised the manuscript and managed the analyses of the study. Author HOCM managed the literature searches and the analyses of the study. All authors read and approved the final manuscript.

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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.
Methods: 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

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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.

1. INTRODUCTION

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

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

Recent studies consistently reveal limited knowledge of antibiotics and irrational use of antibiotics among university students thus increasing the spread of antibiotics. In 2015, a study was conducted to determine knowledge of antibiotic use and self-medication practices among non-medical university students in Jordan [7]. More than half of the students could not accurately identify the uses of antibiotics and have self-medicated in the past. Similarly, a study of antibiotics use among non-medical Nigerian university students revealed gross misuse of antibiotics among the students where

about 72.3% did not adhere to treatment regimen [8].

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

2. METHODS

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

Research instruments were self-administered questionnaires designed to get an overview of students' knowledge of antibiotic use and resistance and obtain information on the attitude and practices of non-medical university students regarding antibiotics usage. The questionnaire was developed after comprehensive literature review of related studies [7, 8, 10, 11] and then modified to suit the local context. The questionnaire was then pre-tested on 20 students and adjusted as appropriate so that the questions were easy and simple to understand and answer while providing accurate information. The 22 points questionnaire comprises three sections. The first part explored socio-demographic data such as age, gender and level of study. The second part consisted of eight questions which evaluated the students' knowledge of key areas of antibiotics, identification, prudent use, indication and possible causes of resistance and based on 3 scale responses, yes, no and not sure. Lastly, the third part consisted of questions related to attitudes and practices towards antibiotics use such as source, adherence, self-medication and reason and consisted of both open and close-ended questions.

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

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

3. RESULTS

A total of 335 students participated in the study out of which 15 questionnaires were excluded

due to incomplete and missing information giving a response rate of 95.5%. Out of the 320 included participants, 134 were males while 186 were females. Most respondents were within the age bracket of 15-25 years (82.5%). Table 1 describes the demographic characteristics of participants.

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 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					
1st year	61(19.1%)	41(67.2)	20(32.8)	512.27	<0.0001
2nd year	105 (32.8)	66 (62.9)	39(37.1)		
3rd year	51 (15.9)	32(62.7)	19(37.3)		
4th year	103 (32.2)	62(60.2)	41(39.8)		

*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*

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

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

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

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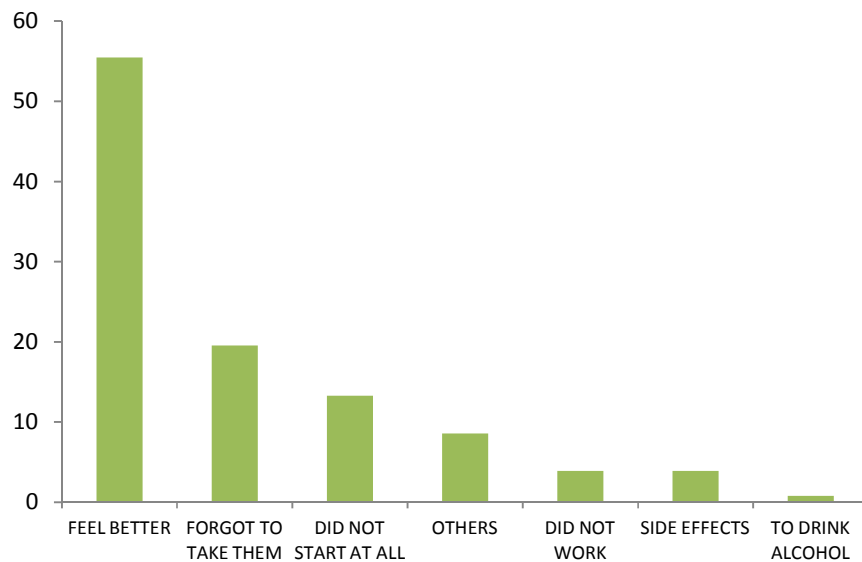

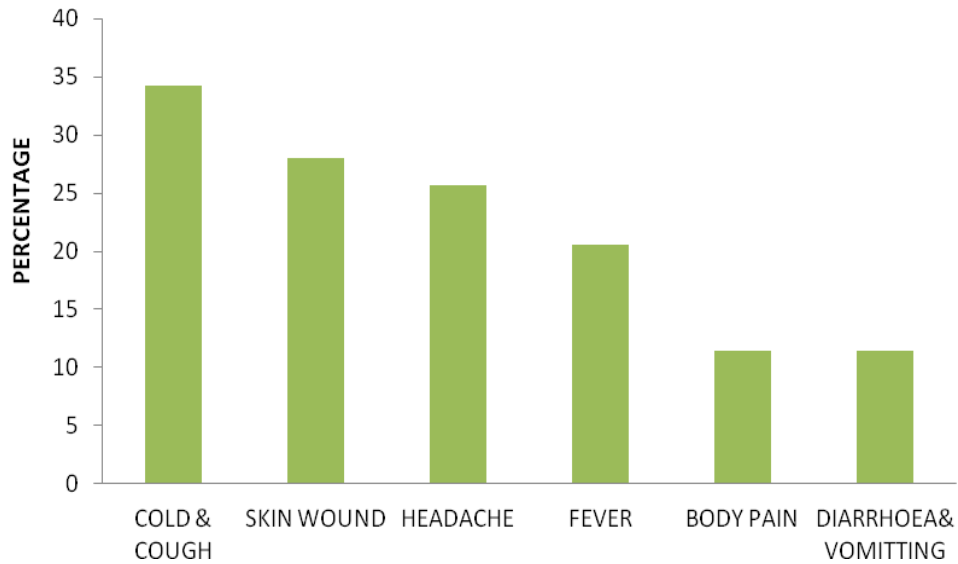**Fig. 1. Reasons for not completing the dose of antibiotic**

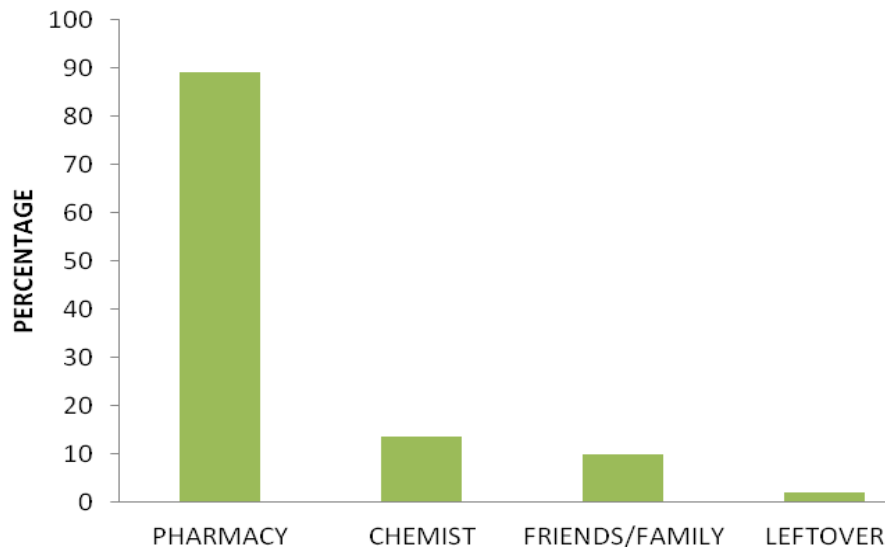**Fig. 2. Symptoms associated with self medication**

Fig. 3. Sources of antibiotics for self- medication

4. DISCUSSION

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

Overall, poor knowledge scores on antibiotic usage and resistance were reported among slightly more than two-third of the respondents indicating a high level of misunderstanding of antibiotics usage and resistance. The age and year of study were found to be major predictors of low knowledge among participants as indicated by their p value = <0.0001. Although majority of the respondents claimed they knew what antibiotics are, just few could answer accurately if antibiotics are effective against

viruses. There is a general false belief that antibiotics can be used to treat all kinds of infections. This inadequate knowledge about the use of antibiotics correlates with findings from previous studies assessing the knowledge of undergraduate students from Nigeria [8,12] and other countries [10]. However, a slightly higher knowledge was reported in studies among students in the medical departments [13]. The present study also showed poor knowledge of the factors responsible for antibiotics resistance. Only, a small proportion of the participants agreed that unnecessary use of antibiotics can lead to resistance and that antibiotics treatment should be completed. These findings clearly show the need for a better explanation of the differences between bacteria and virus in future public health campaigns. Furthermore there is need for focused public education on antibiotics effectiveness and resistance in order to avoid misconceptions.

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

This present study reports that about one in two of the study population had self-medicated prior to the study. This is similar to studies from Nigeria [15-17]. This practice is mostly enhanced by the ease of purchase of antibiotics over the counter without a physician's prescription in Nigeria even though antibiotics are by Nigerian law and regulation classified as prescription only Medicine. The sales of medicines are under-regulated in Nigeria leading to a high incidence

of self-medication practices in the country and consequently adverse effects and antimicrobial resistance. Interestingly, most of the antibiotics used by respondents are the penicillins such as ampicillin, amoxicillin and especially oral penicillins (which are sensitive to β-lactamases) and ciprofloxacin, a fluoroquinolone. High incidence of bacteria resistance to this class of medicines has been reported in the country [18-19]. This self-medication practice might be the contributory factor to the rise in incidence rates of resistance observed among penicillins and emerging reports of resistance among ciprofloxacin. Common cold, cough and catarrh were the major symptoms that were treated with antibiotics without consultation of a physician. This was followed by skin wounds and headaches. Private pharmacies were the major source of antibiotics for self-medication. This result is in agreement to several Nigerian studies which suggest that people obtain the medicines without consulting a physician mainly from community pharmacies [12,16]. Participants also purchased antibiotics from patent medicine stores (chemists) operated by non- pharmacists while some received from friends and leftover antibiotics. In a bid to maximise profit, antibiotics are often sold as over the counter without restrictions in Nigeria. This dangerous practice can also worsen the spread and problem of antibiotic resistance.

To decrease indiscriminate use of antibiotics by the public, adequate awareness and education on the appropriate uses of antibiotic and hazard of antibiotics misuse should be carried out. Patient education can be achieved by individualized counselling, the use of pamphlets, workshops and community wide education. Healthcare providers such as doctors and pharmacists play important role in ensuring appropriate drug use, patient education and counselling. This study also highlights the need for strong enforcement of regulatory policies on drug supply and distribution and the sale of antibiotics in Nigeria.

5. STUDY LIMITATIONS

There are certain limitations which should be taken into account while interpreting the findings of this study. They include the use of convenience sample of study participant which may be associated with selection bias as some students may be missed or over-selected. Also, the use of self-administered question has some limitations such as recall bias because it

depends on the information provided by respondents which may result in over reporting or under reporting.

6. CONCLUSION

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

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard, written approval of Ethics committee has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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QUESTIONNAIRE

Section A

Age:

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

Gender:

Male: [ ]
Female: [ ]

Year of study: …………………………

Secton 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?			

Section C. Attitude to Antibiotics Use

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

A.   Yes   [ ]
B.   No   [ ]
C.   Not Sure [ ]

2.   Did you complete the **last** antibiotics prescribed to you?

A.   Yes   [ ]
B.   No   [ ]
C.   Not Sure [ ]

(Please skip 3 and answer 4, if your answer is YES in above question)

3.   If **NO**, what were your reasons? Because;

A.   You feel better   [ ]
B.   You forgot to take them   [ ]
C.   You did not start the drug at all [ ]
D.   They did not work   [ ]
E.   To be able to drink alcohol   [ ]
F.   Side effect   [ ]

Others (please specify): …………………………………………

4.   Do you think you need to see a doctor before taking an antibiotic?

A.   Yes   [ ]

B.   No   [   ]
C.   Not Sure [   ]

5.   Have you ever received antibiotics from relatives or friends without seeing a doctor?

A.   Yes   [   ]
B.   No   [   ]
C.   Not Sure [   ]

6.   Do you expect your doctor to prescribe antibiotics for you when you are down with cough and catarrh?

A.   Yes   [   ]
B.   No   [   ]
C.   Not Sure [   ]

7.   Have you ever taken antibiotics without being told to do so by a **doctor**?

A.   Yes   [   ]
B.   No   [   ]
C.   Not Sure [   ]

8.   If **YES**, which complaint did you use the antibiotics to treat without seeing a **doctor**?

A.   Headache   [   ]
B.   Fever   [   ]
C.   Cold, cough and Catarrh   [   ]
D.   Body Pain   [   ]
E.   Skin wound   [   ]
F.   Frequent stooling and vomiting [   ]

9.   Please write down the name(s) of antibiotics you have ever taken without seeing a doctor?

A.   ………………………….…
B.   ………………………….
C.   ………………………….
D.   ………………………….

10.   Where do you usually get your antibiotics without doctor's prescription?

A.   Pharmacy   [   ]
B.   Chemist Shop   [   ]
C.   Street Hawkers   [   ]
D.   Friends or Family   [   ]
E.   Leftover antibiotics [   ]

Others (Please specify): ……………………….

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