PATTERN AND DETERMINANTS OF ANTIBIOTICS SELF-MEDICATION FOR UNDER-FIVE CHILDREN IN A RURAL COMMUNITY OF SOUTH-WESTERN NIGERIA.

BY

AKINLADE, KAFAYAT ABOSEDE

(BMLS, AAU, EKPOMA)

MATRIC NO: 172431

A Research project submitted to the Department of Epidemiology and Medical Statistics, Faculty of Public Health, College of Medicine

In partial fulfillment of the requirement for the award of

Degree of Masters of Sciences (Epidemiology)

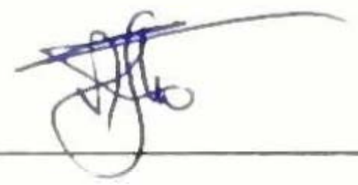
University of Ibadan, Ibadan

Nigeria.

February, 2015

CERTIFICATION

I certify that Akinlade, Kafayat Abosede is my project student and that the research titled "Pattern and determinants of antibiotics self-medication for under-five children in a rural community of South-western Nigeria was undertaken by her for the M.Sc thesis under my supervision and I provided all the necessary assistance as demanded by the research for the period of the study.



Dr. Olufunmilayo I. Fawole, Reader

M.B.B.S. (Ib.), M.Sc (S. Africa), F.M.C.P.H (Nig.), F.W.A.C.P., Cert. Clin. Epid. (S. Africa)

Dept of Epidemiology and Medical Statistics, Faculty of Public Health,

University of Ibadan, Ibadan.

Dr. Joshua O. Akinyemi, Lecturer II

B. Tech (Akure), M.Sc (Ib.), PhD (Ib.)

Dept of Epidemiology and Medical Statistics, Faculty of Public Health,

University of Ibadan, Ibadan.

DEDICATION

This project work is dedicated to the Almighty God, the Alpha and Omega. Also to my little angels; Damilola and Debola Akinlade.

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ACKNOWLEDGEMENTS

Special thanks to Almighty God, the Alpha and Omega, the unchangeable changer. I am particularly grateful to my Supervisors, Dr. Olufunmilayo I. Fawole and Dr. Joshua O. Akinyemi, whom despite their tight schedules were able to guide me through with series of useful advice.

My unreserved appreciation also goes to my entire lecturers in the Dept. of Epidemiology and Medical Statistics for their immense inputs and also to all other members of staff and my colleagues, I say thank you.

My sincere appreciation also goes to Mr. O.O. Owojuyigbe for his effort towards my academic pursuit and all his fatherly advice. Also, my friend, Mrs Olubukola Odusanya for her supports and Esther who assisted me with the data collection. May the Lord continue to be with you and your entire household.

I am also grateful to all wonderful mothers that participated in this study, may you not weep over your children in Jesus name. Also, to all authors whose works were quoted in this project, I say thank you.

I am deeply indebted to my parents for giving me a good start in life. They inculcated in me right from my youth, a strong drive to value education.

I shall not forget to show my appreciation to my love, Mr. Olumide Akinlade and my angels; Damilola and Debola for their understanding and supports. May we live to reap the fruits of our labour. Thank you and God bless.

ABSTRACT

Background: Self-medication is a concept that encourages individuals to look after minor ailments with simple and effective remedies. Globally, young children consume considerable amount of antibiotics as a result of their increased susceptibility to infections, particularly, upper respiratory tract infection and majority of these children are treated at home by the parents. Indiscriminate use of antibiotics has led to a continued increase in the rate of resistant bacteria which has left Clinicians with limited drug options for the treatment of bacteria infectious diseases hence, the aim of this study is to determine the pattern and determinants of antibiotics self-medication for under-five children in a rural community of South-western Nigeria.

Methodology: A community-based cross-sectional survey was conducted among mothers that had at least one under-five child between October and December, 2014. Data were collected using a semi-structured, interviewer-administered questionnaire. The data were analyzed with SPSS version 20 using descriptive statistics, Chi-square test and logistic regression.

Results: The result from this study showed that a very high proportion (96.5%) of mothers in this rural community relied on antibiotic self-medication for the treatment of various health conditions like cough (66.1%) and fever (42.5%). The most commonly used antibiotics were: Septrin (64.3%) and Flagyl (44.1%) with drug vendors (64.9%) being the major source of information. Mothers' level of knowledge of the hazards of antibiotic self-medication was also very low (28.1%). Chi-square test revealed that there is a significant association between respondents' educational status ($P< 0.05$), occupation ($P< 0.05$) and knowledge of the hazards. Hence, there is a need to educate the mothers on the risks and dangers of antibiotic self-medication in other to curb the menace of antibiotic resistant bacteria.

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1.0 INTRODUCTION

Self- medication is defined as the consumption of medicinal products with the purpose of treating diseases or symptoms or even promoting health without a prescription provided by a medical professional (Arikpo et al., 2009). Self- medication is a concept that encourages individuals to look after minor ailments with simple and effective remedies has been adopted worldwide (Awad et al., 2005). Inappropriate self- medication results in irrational use of drugs, waste of resources, increased resistance to pathogens, and often results in serious health hazards such as adverse reactions and prolonged suffering (Kaushal et al., 2012). Drugs prone to self-medication include; analgesics, antimalarials, antibiotics and cough syrups among others (Osemene et al., 2012).

Antibiotics are naturally occurring microbial products; some can be manufactured synthetically while others are products of chemical manipulation of naturally occurring compounds (Greenwood et al., 2002). Antibiotics are potent drugs which have saved millions of lives but, when used incorrectly they can pose a health risk to the patients as well as contribute to the development of bacteria resistance to these drugs (Arturo et al., 2013). Several studies have shown that inappropriate self- medication with antibiotics occur for common colds or upper respiratory tract infections, both of which are largely self- limiting (Thi et al., 2011). Self-medication with antibiotics occurs in many developing countries where drug sales are not well regulated hence; there is easy access to over- the- counter medicines without prescription (Osemene et al., 2012). Self- medication with antibiotics is an important factor contributing to the development of bacteria antibiotic resistance. Antibiotic resistance occurs when bacteria

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1.0 INTRODUCTION

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change in some way that reduces or eliminates the effectiveness of the drugs, chemicals or other agents designated to cure or prevent infections and thus survive and continue to multiply causing more harm. Antibiotic resistance is a serious and growing phenomenon in contemporary medicine and has emerged as one of the pre-eminent public health concerns of the 21st century. (WHO, 2004). The rate of antibiotic resistance has continued to increase which have left clinicians with limited drug options for the treatment of bacteria infectious diseases. For example, most bacteria isolates like *Streptococcus pneumonia, Haemophillus influenza* and *Moraxella catarrhalis* which are the most common pathogens causing acute bacterial rhinosinusitis in children in both the developed and developing countries have already demonstrated resistance to first line antibiotics (Parimi et al., 2004).

Globally, young children consume considerable amounts of antibiotics as a result of their increased susceptibility to infections, particularly upper respiratory tract infection (Dong et al., 2008). Febrile illnesses in children constitute a common presentation in Nigeria and other countries in sub-Saharan Africa, the major cause being malaria and respiratory tract infections (Oshikoya et al., 2007). The majority of these children are usually treated at home either with antimalarial alone (Ajayi and Falade, 2006) or in combination with antibiotics when upper respiratory tract infections are suspected by the parents (Olayemi et al., 2005). National Demographic and Health Survey (NDHS, 2013) report showed that only 35% of sick children were taken for treatment in a health facility in Nigeria.

In Nigeria, there is only very limited control on the sale or advertisement of antimicrobials creating opportunities for misinformation and misperceptions that can result in improper antibiotic use (Okeke et al., 2007). Children are important target group in need of appropriate treatment and because the occurrence of antibiotic resistance must be limited, it is important to

identify the pattern and determinants of antibiotic self- medication in under- five children. It is also crucial to assess the parental knowledge on the hazards of antibiotic self- medication for their children.

1.1 Problem statement

In Nigeria, access to health facilities remain a problem in most parts of the country with most rural community lacking basic facilities such as; hospitals and clinics with doctors and nurses (Oshikoya etal.,2007). Many rural people live several kilometers away from a health care facility where they can consult a medical practitioner thus, they often engage in self- medication to care for illnesses (Oshikoya et al., 2007). Antibiotic misuse is currently one of the major public health issues worldwide (Arwa et al., 2011). Most mothers in rural areas do not consult a physician when their children are sick; they either go to a drug store to obtain medicine from the shelf or consult a neighbor or friend who may give some left- over medicines. Mothers also store antimalarials and antibiotics at home in anticipation of febrile illness in their children (Oshikoya et al., 2007). This irrational use of antibiotics has become a common practice and infectious disease is aggravated by uncontrolled use of antibiotics (Abdulah, 2012).

Antibiotics are potent drugs which since their discovery have saved millions of lives; however, when used incorrectly they can pose a health risk to the patient as well as contribute to the development of bacteria resistance (Arturo et al., 2013). With increasing resistance, effective therapy for many common infections now requires newer and more expensive agents, resulting in a higher risk of morbidity and mortality especially among children in low income countries (Ecker et al., 2013). Despite the deleterious effect of this practice, not many studies have been done to identify the pattern and determinants of antibiotics self-medication as regards to rural under- five children in South- western Nigeria.

1.2 Justification

Globally, it is estimated that about 14 million children under the age of five years die annually and are disabled by preventable childhood febrile illnesses; these illnesses include malaria, respiratory infections, measles, diarrhea diseases and malnutrition (WHO, 2004). Several ethnographic studies conducted in different parts of Nigeria (Ibeh et al., 2005; Adegboyega et al., 2005; Ezechukwu et al., 2005) indicated that most caregivers indeed take action against their under- five children's febrile illness within the first 24hours but only few of such actions could be classified as appropriate under the national treatment guidelines (FMOH, 2005). Researchers have documented that caregivers response to childhood febrile illness are influenced by socio- economic, cultural and demographic factors and ease of access to treatment sources (Ajayi and Falade, 2006; Arwa et al., 2011). Self-medication is so common and not likely to stop in the near future so; there is a need to know how it is done to encourage good practice.

In Nigeria, little is known about the pattern and determinants of antibiotic self- medication in under- five children in rural communities thus; gaining a better understanding on the pattern and determinants of antibiotic self- medication for under-five children in rural communities will allow appropriate educational interventions and reduce unnecessary antibiotics use in children. This study will provide useful information to the policy makers on the need to make health services more accessible and responsive to the needs of the population. It will also help to prevent the development of antibiotic resistance, antibiotic abuse and the development of new generation antibiotics which are unaffordable to most people in the developing world particularly those in the rural areas.

1.3 Objectives

Broad objective

The broad objective of this study is to describe the pattern and determinants of antibiotic self- medication for under- five children in a rural community of South- western Nigeria.

Specific objectives

1. To determine the prevalence of antibiotic self-medication for under-five children by caregivers.

2. To identify the type of antibiotics being used for self-medication by caregivers of under-five.

3. To assess the mothers knowledge on the hazards of antibiotic self-medication.

4. To identify the predictors of knowledge of hazards of antibiotics self-medication.

5. To identify the factors which influence antibiotics self-medication for under-five children by the caregivers.

Research questions

The study will provide answers to the following questions:

1. What proportion of caregivers use antibiotic self- medication for their under- five children?
2. What are the types of antibiotic used for self- medication in under-five children?
3. Do the mothers know the possible hazards of self-medication with antibiotics?

3. What are the factors that influence knowledge of caregivers on antibiotic self-medication?
4. What factors influence antibiotic self- medication for under- five children in a rural community?

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 History of Antibiotics

The search for antibiotics began late in the 17th century with the growing acceptance of the germ theory of disease, a theory that linked bacteria and other microbes to the causation of a variety of ailments. Antimicrobials are one of the most successful forms of chemotherapy in the history of medicine and have contributed to the control of infectious diseases that were the leading cause of human morbidity and mortality for most of human existence (Aminov, 2010). In the late 1800s, Ernest Duchesne a French Physician while working on his thesis noted that certain Penicillin moulds killed bacteria. However, he failed to bridge a connection between the fungus and a substance that had antibacterial properties and when he died, his work also died.

The history of modern rational chemotherapy did not begin until Erhlich (1854-1915) developed the idea from his observation that aniline dyes selectively stained bacteria in tissue microscopic preparations and could selectively kill them (Bosch and Rosich, 2008). He discovered a medicinally useful drug, the synthetic antibacterial Salvarsan now called, Arsphenamine. In 1928, Fleming accidentally discovered the long- known ability of *Penicillium* to suppress the growth of bacteria cultures but, put the findings aside as curiosity due to lack of appreciation of its potentialities as well as the difficulty of preparing enough for experiments (Gaash, 2008). Florey and Chain published a paper describing the purification of Penicillin in quantities sufficient for clinical testing, their protocol eventually led to Penicillin mass production and distribution in 1945(Chain et al, 2005). The first antibiotic, Penicillin (discovered in 1929 by Sir Alexander Fleming), had unbelievable ability to treat the bacterial infections especially those

caused by *Staphylococcus* and *Streptococci* without harming the host. The discovery of the first three antimicrobials, Salvarsan, Prontosil, and Penicillin, was exemplary, as those studies set up the paradigms for future drug discovery research. The paths, followed by other researchers, resulted in a number of new antibiotics, some of which made their way up to the patient's bedside. The period between the 1950s and 1970s was indeed the golden era of discovery of novel antibiotics classes (Aminov, 2010).

2.2 Classification of Antibiotics

Antibiotics are naturally occurring microbial products; some can be manufactured synthetically while others are products of chemical manipulation of naturally occurring compounds (Greenwood et al., 2002). Antibiotics are commonly classified based on their; mechanism of action (as bacteriocidal or bacteriostatic), chemical structure (as beta- lactams, tetracyclines, macrolides, aminoglycosides, quinolones, cyclic- peptides, lincosamide, oxazolidinones and sulfa antibiotics) or spectrum of activity (as broad and narrow spectrum). (Farrer, 2011). Bacteriostatic antibiotics arrest the growth cycle of bacteria, thereby limiting spread of infection and allowing the host immune system to eliminate remaining organisms (Rosen et al., 2000). The effect may be reversible when the drug is removed, the organism will resume growth and infection or disease may occur. Among the bacteriostatic antibiotics are; the tetracyclines, spectinomycin, trimethoprim, chloramphenicol, macrolides lincosamides and Sulphonamides (Laurence et al., 1980).

In contrast, bactericidal antibiotics kill all infecting pathogens (Rosen et al., 2000). They include the Penicillin, daptomycin, Metronidazole, Nitrofurantoin, Co-trimoxazole Aminoglycosides, Bacitracin, Quinolones, Vancomycin and Rifampicin (Katzung, 1997). However, the classification of antibiotics as bactericidal or bacteriostatic has limitations because

some agents that are considered to be bacteriostatic may be bactericidal against selected organisms e.g. Chloramphenicol which is often bactericidal against *Pneumococci*, *Menigococci* and *Hemophillus influenza.* Antibiotics like; Penicillin, Cephalosporins and Vancomycin act by inhibiting cell wall synthesis while those like Polymyxins inhibit cell membrane synthesis (Katzung, 1992). Others like Tetracyclines, Erythromycins and Aminoglycosides inhibit protein synthesis while Quinolones and Sulphonamides inhibit nucleic acid synthesis (Katzung, 1992). Broad spectrum antibiotics are effective against a broad range of microorganisms in comparison to narrow spectrum antibiotics.

2.3 Description of Bacteria

Bacteria are single- celled organisms usually found inside and outside of our bodies except in the blood and spinal fluid. Many bacteria are not harmful; in fact, some are actually beneficial. The cell structure of the bacteria is simpler than that of other organisms as there is no nucleus or membrane bound organelles instead, their control centre containing the genetic information is contained in a single loop of DNA (Society for General Microbiology, 2014). Bacteria can be divided into categories primarily by their shape. arrangement and Gram staining characteristics (Rosen et al., 2000). The shape of a bacterium is determined by its rigid cell wall while orientation and attachment during cell division determine the arrangement of cells. Bacteria are identified and grouped by their shapes as: cocci. bacilli. spirochaetes. vibrio and spirilla that are arranged in pairs. chains or clusters.

Gram- positive cell wall have thick layer of peptidoglycan that may be surrounded by a layer of teichoic acid (Rosen et al., 2000). Gram negative wall has an inner periplasmic space and a complex outer layer made up of lipopolysaccharide (endotoxin). lipoprotein and

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phospholipids. The rest of the cell structure consists of phospholipids bilayer cell membrane, cytoplasm with ribosome, granules and metabolites, the nucleoid region containing the cells deoxyribonucleic acid (Rosen et al., 2000). Bacteria reproduce by binary fission and exhibit an exponential growth pattern.

2.4 Definition of self- medication

Self- medication is the use of drugs with therapeutic intent but without a professional advice or prescription. It is also referred to as the use of non- prescription medicines by people on their own initiative (Osemene et al., 2012). Self- medication can also be defined as the consumption of medicinal products with the purpose of treating diseases or symptoms or even promoting health without a prescription provided by a medical professional (Olayemi et al., 2005). Self medication is a major form of self-care and drugs that are prone to self- medication include: analgesics, antimalarials, antibiotics and cough syrups among others (Afolabi, 2008). Medicines for self medication are often called Over the Counter (OTC) drug, which are available without a doctor's prescription through pharmacies, mostly in the less developed countries (Sonam et al., 2011).

Self- medication with antibiotics could cause bacteria resistance to such antibiotics and may precipitate the emergence of multiple resistant organisms that would be difficult to treat (Fadara et al., 2011). Self- medication has been found to be a common type of self-care behavior among the population of many countries and a lot of studies have investigated the prevalence and nature of self- medication practices in different countries and among different population.

2.5 Antibiotics self- medication in under- five children

The burden of childhood disease of a country is a determinant of her drug use pattern for children. An antibiotic have a major role in the treatment of bacterial infections which have led to significant reduction in child morbidity and mortality rates worldwide however, antibiotic consumption rate has significantly increased around the world since the introduction of antibiotics (Cebotarenco and Bush, 2007).

Children constitute a vulnerable group with regard to antibiotic abuse or misuse. Studies from both developed and developing countries show that misconceptions about antibiotics and their use are prevalent in the lay populations (Arturo et al., 2013). Any response to illness depends on the ability of parent or caregiver to recognize correctly that a problem in the form of signs and symptoms is occurring and to evaluate the seriousness of those indicators once recognized. Parents or caregivers often try various treatment modalities for their sick children before taking them to the clinic (Afolabi et al., 2004). The problem of the unnecessary use of antibiotics among children is of special concern in low and middle income countries because of higher prevalence of infectious diseases and shortcoming in hygiene, sanitation and public health problem (Reynolds et al., 2009). Studies have been conducted to measure the extent of parental self-medication to their children. In Turkey, (Akici et al., 2004), found that almost 60% of parents had self-medicated their children before visiting the doctor. Likewise, (Miao et al., 2014) found that 62% of the children in rural China had received antibiotic self- medication. Also, in Brazilian village 50-66% of the parent uses antibiotics as an OTC medication for their children (Hardon, 2010). Studies from low- income countries like Philippines revealed that antibiotics are routinely given in self medication for non-severe childhood diarrheal illness (Justice et al., 2010). A cross sectional survey in 10 districts of Ulaanbaatar Mongolia's capital, using structured

questionnaire for 540 household with at least a child aged less than five years found that of 503 participants 42.3% used non- prescribed antibiotics to treat symptoms in their child. Symptoms commonly treated were cough (84%), fever (66%), nasal discharge (65%), and sore throat (60%). Amoxicillin was the most commonly used antibiotics (58%) and pharmacies were the main source (86%) of non-prescribed antibiotics (Allan, 2009).

Preschool children are the group that are highly exposed to antibiotics in the Ecuador community and in case of such young children the final decision about antibiotic treatment is usually taken by the child's caregiver, usually the mother (Arturo et al., 2013). Ezechukwu et al., (2005) in a study conducted in Nnewi, Enugu State, Nigeria observed that 17.1% of mothers that participated in the study had self- medicated their children with antibiotics before seeking medical help and also,19.4% of mothers in rural Osun State also self- medicate their children with antibiotics (Adedire et al., 2013). The empirical treatment of fever with antibiotics without further microbiological investigations had been considered as a major component of irrational drug use among communities of the developing countries in general (Awad et al., 2005). Antibiotic misuse has been found to be significantly frequent in children especially when presenting with viral upper respiratory infections (Cebotarenco and Bush, 2007). Thus, misuse and abuse of antibiotics in under- five children is a major public health problem worldwide that needs urgent attention.

2.6 Factors which influence antibiotics self- medication in under- five children.

The under- five mortality in Nigeria is mostly due to birth asphyxia, malaria, severe anaemia, septicemia and malnutrition (Fetuga et al., 2007). This probably explains why the use of antimalarial and antibiotics for under- five children in Nigeria is very high (Nwolisa et al., 2005). The reasons for high prevalence of self- medicating children with antibiotics are multifactorial and these may include; lack of appropriate healthcare, poor financial capacity, perception of the child's illness, habit of antibiotic storage at home, lack of regulation and enforcement, time and convenience, cultural factors and mother's level of education.

2.6.1 Lack of access to appropriate health care

Health is a major form of human capital and there is a substantial relationship between health and economic development (Awoyemi et al., 2011). The availability of basic health services provided by the PHC especially to rural areas in a country might be used as a yardstick to measure the extent of its health level of development. The goal of Primary Health Care (PHC) was to provide accessible health for all by the year 2000 and beyond unfortunately, this is yet to be achieved in Nigeria and seem to be unrealistic in the next decade (Abdulraheem et al., 2012). Though, PHC centers were established in both rural and urban areas in Nigeria with the intention of equity and easy access; regrettably, the rural populations are seriously underserved when compared with their urban counterparts. The inadequacies in the access to health facilities have reduced the life expectancy of rural inhabitants and increased infant mortality (Ajala et al., 2005). The provision of health care at PHC level is largely the responsibility of local

governments with the support of state ministries of health and within the overall National health policy (Nigeria constitution, 1999).

Inadequacy in the quality of PHC facilities in Nigeria was felt to be the product of failure in a range of quality measures in terms of structural and process (Abdulraheeem et al., 2012). Over 70% of Nigeria inhabitants live in rural communities yet, the area has not attracted sufficient health facilities that would substantially improve the health need of the rural dwellers (Ajilowo et al., 2007). This may influence antibiotic self- medication in under- five children in Nigeria as a result of difficulty in accessing health facilities. Medical facilities are not evenly distributed across the country with most rural areas lacking basic facilities such as hospitals and clinics as well as doctors and nurses. Many people lives several kilometers away from a health care facility where they can consult a doctor in case of illness thus; the majority of antibiotics are consumed in the community and there is plenty opportunity for incorrect use.

2.6.2 Poor financial capacity

Economic considerations are also important determinants of community antibiotic use. Poor financial capacity influences the use of antibiotics in that poor parents will often not be able to afford a doctor visit or full treatment (Arturo et al., 2013). Studies in low income countries showed that the cost of medical consultation and low satisfaction with medical practitioners were related to self- medication with antibiotics. In most part of Nigeria, the cost of medications for children is borne by parents and the implication of this is that health care is either not sought or delayed leading to under- treated morbidity and mortality (Oshikoya et al., 2010).

Poverty is a common trend in developing countries with transitional economies and has been recognized by the WHO as one of the key barriers to accessing essential medicines

(Oshikoya et al., 2010). In developing countries, political corruption and mismanagement of funds, personnel and development programs have created large populations living in abject poverty and at high risk for infection and the cost of medical treatment even subsidized treatment is beyond the means of many patients.

2.6.3 Perception of illness in the child

A perception of the illness in the children as well influences antibiotic self- medication. Mothers often practice self- medication when they think the illness is minor and the onset of the symptoms or if the episode is similar to a previous one (Thi et al., 2011). Most parents also have considerable misunderstanding that may contribute to inappropriate antibiotic use. Miao et al., (2014) in a study conducted in rural China found that 79% of parents thought that antibiotics could cure infections caused by viruses. Half of the parents in the study believed that antibiotics could shorten the duration of URTI symptoms and that taken antibiotic in advance could protect children from the common cold. Parent's misconceptions about appropriate indication for antibiotics use leads to an increase in their children's consumption of antibiotics often without physician's knowledge.

2.6.4 Habit of antibiotic storage at home

Storing antibiotics at home also increases the probability of self- medicating children with antibiotics (Miao et al., 2014). A global survey found that living in a country where antibiotics are dispensed in fixed- count packs rather than as the exact number of pills required is a strong predictor for possession of left-over antibiotics (Kardas et al., 2007). Also, a study on antimicrobial drug storage among Spanish households showed that 42% of them have drugs at home including those currently used (Grigoryan et al., 2006)

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2.6.5 Lack of regulation and enforcement

Poor regulation of antibiotics due to absence of enforcement of policies on the sales of antibiotics makes most parents to have easy access to antibiotics. Having purchased antibiotics from retail pharmacies without a physician prescription is also a critical factor contributing to antibiotic self- medication in children (Morgan et al; 2011). Drug dispensers often ignore National legislation when selling drugs to customers since they know that law enforcement is impossible.

The National Agency for Food and Drug Administration and Control (NAFDAC) responsible for regulating local manufacturing, importation, exportation, advertisement, sales and distribution of processed foods and drugs in Nigeria. These processes are done in accordance with decree 19 of 1999 (Oshikoya et al., 2010). In spite of holistic and multidimensional approach of NAFDAC, unlicensed private pharmacies are proliferating and are involved in selling medicines without prescription. This act has promoted irresponsible self- medication for children.

2.6.6 Time and convenience

Many mothers that participated in the study by Thi et al, (2011) mentioned that time and convenience particularly, the long waiting time is the reason for self- medication and for not seeking public professional health care. Convenience relate to the fact expressed by the mothers that drug can easily be bought in the local village.

2.6.7 Cultural factors

Drug use is influenced by cultural preferences and beliefs; folk beliefs and traditions are felt to influence antibiotic use in many cultures. Common cultural beliefs about antibiotics include the notions that there is a pill for every symptom; antibiotics can heal many illnesses including dyspepsia and headaches and that injection are more powerful than pills (Okeke et al., 2007). The misuse of antibiotics frequently becomes integrated into the local culture. In Indian, there is a belief that the ill body requires both antibiotics and a tonic to enhance its innate strength. Mothers in Ghana also belief that antibiotics can be used to treat cough and fever. Also in Philippine, taking antibiotics is a common practice to prevent diarrhea especially after eating foods of doubtful hygienic status (Radyowijati et al., 2002). Rural populations in Brazil regard Ambra- Sinto$^{(R)}$ (Tetracycline- HCL) as the medicine of choice against measles. It is believed that any fever in children may signify measles thus most fevers are treated with Ambra- Sinto. (Radyowijati et al., 2002).

2.6.8 Mother's level of education

Better education of mothers has a greater protective effect on the children. The education of mother is an influential factor in the knowledge and use of antibiotics in case of any illness because it allows greater access to the basic information on health education in order to recognize the symptoms and signs that require urgent attention (Arturo et al., 2013). Women in rural areas are far less likely to be educated than their urban counterparts hence, children of mothers with more than secondary education are likely to get better care and appropriate treatment (Adedire et al., 2013).

2.7 Consequences of antibiotic self-medication

Antibiotic misuse is currently one of the major public health issues worldwide (Arwa et al, 2011). Its irrational use increases the risk of adverse events, bacterial infection and hypersensitivity (Sonam et al., 2011). In fact high rate of self- medication with antibiotics may cause several problems to the child including slowing down of the child's development and unbalanced bacterial distribution (Miao et al., 2014). A major problem of self- medication with antimicrobials is the emergence of human pathogens resistance worldwide particularly in developing countries where antibiotics are often available without a prescription (Olayemi et al., 2005). Resistance occurs when sub-therapeutic dosage of the antibiotic is administered to cure or prevent infection thereby causing the microorganisms to develop adaptations in order to survive and resist future doses of antibiotics. Thus, subsequent administration of even therapeutic doses of the antibiotic will lead to non efficacy of the drugs towards inhibiting the growth or killing the microorganisms. Resistant isolates have been found in healthy persons and those with community acquired infection in developing countries (Abu- Saheed et al., 2013).

WH● states that resistance to antimicrobials is one of the world's greatest public health problems and a major cause being the irrational use of medicines (Goossens et al., 2005). The World Health Assembly in 2005 cautioned that antimicrobial resistance was rapidly increasing with resistance of up to 70-90% of the first- line antibiotics to dysentery, pneumonia and hospital infections (Akinyandenu and Akinyandenu, 2014). The consequence of this is the loss of relatively cheap drugs that will require new drug development which will be more expensive and will further disadvantage patients in developing countries (Awad et al., 2005).

Antibiotic resistance is an economic burden on the healthcare system and the financial burden of the emergence of bacterial resistant strains is significant (Arwa et al, 2011). Resistant infections not only cost more to treat, but also can prolong healthcare use. In a 2008 study of attributable medical costs for antibiotic resistant infections, it was estimated that infections in 188 patients from a single healthcare institution cost between $13.35 and $18.75 million dollars (Roberts et al., 2009). Unfortunately, infections caused by antibiotic resistant bacteria are an everyday occurrence in healthcare settings moreover, resistance is not just a problem for the patient who is infected. When an infection is not effectively treated because of resistance, the microorganisms will persist and potentially spread to others, further extending the resistance problem.

Self- medication with antibiotics does not only promote antibacterial resistance but can also promote adverse drug effects, and complications (Akinyandenu and Akinyandenu, 2014). Adverse drug reactions are a significant problem in the Nigerian children and globally, the physicians are faced everyday with problems of adverse drug reactions (Oshikoya et al., 2007). Many antibiotics lead to adverse effects through different means; trimethoprim depresses folic acid in both microorganism and host, chloramphenicol depresses bone marrow in all recipients and flouroquinilones can also cause multiple adverse effects which may be long lasting (Akinyandenu and Akinyandenu, 2014). Self- medication may result in interaction with other drugs, which can aggravate certain medical conditions and can even results to death as well.

CHAPTER THREE

3.0 Methodology

3.1 Study site.

Koko- village is a rural settlement in Olodo community in Egbeda Local Government Area of Oyo State, Nigeria. The residents are majorly of Yoruba ethnic group. The village is inhabited mainly by artisans, traders, civil servants and the unemployed. The estimated population is about 2000 and the community lacks basic social amenities like tarred road, electricity, pipe borne water and public health facilities. The village is about 10km to the nearest Primary health facility which is located at Iyana-Church, Ibadan. Most inhabitants rely on the patent medicine vendors (an individual without formal pharmacy training who sells orthodox pharmaceutical products on retail basis for profit) and self-medication in case of any illness.

3.2 Study design

A community- based cross- sectional household survey was conducted in households that have at least one under- five children.

3.3 Study population

Mothers or caregivers of under- five children in the community were interviewed using a pretested semi-structured questionnaire.

3.4 Sample size.

The sample size was calculated using the formula;

$$n = \frac{Z_{\alpha}^{2}\ Pq \times \text{Design effect}}{d^2}$$

Where; n= estimated sample size.

Z= Z statistic corresponding to a chosen level of confidence (1.96 at 95% confidence interval was assumed).

P= Prevalence of antibiotic self- medication in under-five children in Osun state; 19.4% was used (Adedire et al, 2013).

d= level of precision (0.05 assumed).

D= Design effect (2.0 assumed).

Thus,

$$n = \frac{1.96^2 \text{ x } 0.194 \text{ x } (1 - 0.194) \times 2.0}{0.05^2} = 480.5 \approx 481 \text{ subjects}$$

3.5 Sampling strategy

A purposive sample of all women with under-five children in every household was recruited for the study. This was done by going from house to house and all consenting mothers or caregivers that had at least one under five child was recruited for the study while those that did not have under five children were excluded.

3.6 Data collection

Data was collected using pre-tested semi-structured interviewer administered questionnaire between October and November 2014. The questionnaire was used to collect information on socio-demographic characteristics such as; age, marital status, educational level, occupation, spouse occupation, spouse educational level, religion, number of children and age of the little child. Respondents were asked whether they normally treat their under-five children with antibiotics on their own, those who answered yes were asked; the type of antibiotics used, for what health condition was it used, reasons and source of antibiotic information. Questions like does antibiotic have any side effect, have you heard about antibiotic resistance, does self-medication increase the risk of antibiotic resistance, are some germs becoming harder to treat with antibiotics were asked to assess the mothers' knowledge on the hazards of antibiotic self-medication.

3.7 Study variables

Dependent variable: Antibiotics self-medication, the type of antibiotics used and mothers' knowledge of the hazards of antibiotic self-medication.

Explanatory variables: Socio-demographic factors (age, occupation, level of education, marital status, religion, number of children, spouse's occupation, spouse's educational status), health conditions or illness (cough, fever, diarrhea) and reasons for self-medication.

3.8 Data analysis

Data collected were entered and analyzed using Statistical software for Social Sciences (IBM SPSS 20). Summary statistics was presented using frequency tables, and bar chart; Chi-square test and logistic regression were done to examine the predictors of knowledge of hazards of antibiotic self- medication; 95% confidence interval and P- value were also calculated to determine the statistical significance.

3.9 Ethical consideration

Voluntary inform consent was obtained from each participating mother through signing or thumb printing of the inform consent form after giving adequate information about the study. Names of the participants were not included in the questionnaire to avoid any form of identification. The participants were assured of the confidentiality of any information given and that they can withdraw from the study at any time. They were also told that the result of the study will be communicated back to the community. Ethical approval was obtained from the Oyo State Ethical Review Committee.

CHAPTER FOUR

RESULTS

4.1 Socio demographic information of respondents

The demographic characteristics of the 513 respondents are summarized in Table 4.1. The majority of the respondents were currently married (95.9%). The age of the respondents ranged from 15 to 55years with a median age of 34.0years. The occupations of the respondents were skilled labour (53.8%), unskilled labour (20.5%), professionals (13.6%) and unemployed (12.1%). The highest level of education was secondary education (52.8%) while most of them were moslems (52.0%). Number of birth ranged between one to seven children (median=3.0 children) while the age of the youngest child ranged from zero to 48 months with median age of 3.0 months.

Table 4.1: The socio-demographic characteristics of respondents

Characteristics	Frequency (n=513)	Percentage (%)
Age (yrs)		
15-24	48	9.3
25-34	223	43.5
35-44	214	41.7
45 and above	28	5.5
Marital status		
Currently Married	492	95.9
Not currently married	21	4.1
Educational status		
No formal education	40	7.8
Primary	105	20.5
Secondary	271	52.8
Tertiary	97	18.9
Occupation		
Professional	70	13.6
Skilled labour	276	53.8
Unskilled labour	105	20.5
Unemployed	62	12.1
Spouse occupation		
Professional	88	17.2
Skilled labour	343	66.9
Unskilled labour	72	14.0
Unemployed	10	1.9

Spouse educational status		
No formal education	17	3.3
Primary	56	10.9
Secondary	311	60.6
Tertiary	129	25.1
Religion		
Islam	267	52.0
Christianity	246	48.0
Number of children raised		
1-4	429	83.6
5-7	84	16.4
Age of children		
0-11mths	27	5.3
12-23mths	269	52.4
≥24months	217	42.3

4.2 Pattern of antibiotics self-medication for under-five children

Overall prevalence of antibiotics self-medication for under-five children was 96.5% (495). Mothers within the age range of 15 to 24years (100%), not currently married (100%), with primary educational level (100%) had highest prevalence. Mothers whose spouses' were unskilled labourers, unemployed with primary educational level also had a prevalence of 100%. Chi-square analysis revealed that mothers' educational status, spouse occupation and spouse educational status were all significantly associated with antibiotic self-medication for under-five children ($P< 0.05$). The results are presented in table 4.2 below.

Table 4.2: Pattern of antibiotics self-medication for under-five children

Characteristics	Antibiotics self-medication		
	Yes (%) N=495 (96.5%)	No (%) N=18 (3.5%)	P-value
Age (yrs)			
15-24	48(100)	0(0.0)	0.643*
25-34	214(96.0)	9(4.0)	
35-44	206(96.3)	8(3.7)	
45 and above	27(96.4)	1(3.6)	
Marital status			
Currently married	474(96.3)	18(3.7)	1.000*
Not currently married	21(100)	0(0.0)	
Educational status			
No formal education	39(97.5)	1(2.5)	0.000*
Primary	105(100)	0(0.0)	
Secondary	265(97.8)	6(2.2)	
Tertiary	86(88.7)	11(11.3)	
Respondent's occupation			
Professional	64(91.4)	6(8.6)	0.073*
Skilled labour	267(96.7)	9(3.3)	
Unskilled labour	104(99.0)	1(1.0)	
Unemployed	60(96.8)	2(3.2)	
Spouse occupation			
Professional	76(86.4)	12(13.6)	0.000*
Skilled labour	337(98.3)	6(1.7)	
Unskilled labour	72(100)	0(0.0)	
Unemployed	10(100)	0(0.0)	
Spouse educational status			
No formal education	16(94.1)	1(5.9)	0.000*
Primary	56(100)	0(0.0)	
Secondary	307(98.7)	4(1.3)	

Tertiary	116(89.9)	13(10.1)	
Religion			
Islam	262(98.1)	5(1.9)	0.052
Christianity	233(94.7)	13(5.3)	
Number of children raised			
1-4	413(96.3)	16(3.7)	0.750*
5-7	82(97.6)	2(2.4)	
Age of little child			
0-11mths	26(96.3)	1(3.7)	0.505*
12-23mths	262(97.4)	7(2.6)	
≥24mths	207(95.4)	10(4.6)	

*Fisher's exact value

4.3 Antibiotics used for self-medication in under-five children

The antibiotics that mothers used for the self-treatment of their children were; Septrin, Amoxicillin, Flagyl, Ampiclox, Ampicillin, Chloramphenicol, Tetracycline, Augmentin and Gentamycin (Table 4.3). Of these antibiotics, Septrin 330 (64.3%) was the most commonly used antibiotics followed by Flagyl 226 (44.1%), Amoxicillin 135 (26.3%) and Ampiclox 129 (25.1%).

Table 4.3: Antibiotics used for self-medication in under-five children

Antibiotics	Frequency	Percentage (%)
Gentamicin	3	0.6
Augmentin	26	5.1
Chloramphenicol	18	3.5
Ampicillin	44	8.6
Tetracycline	45	8.8
Ampiclox	129	25.1
Amoxicillin	135	26.3
Flagyl	226	44.1
Septrin	330	64.3

4.4 Respondents source of antibiotics information

The majority of respondents obtained their information (Fig.4.1) on antibiotics use from drug hawkers or vendors (64.9%), previous doctors' prescription (60.0%), personal experience (44.6%), opinion of friends or relations (35.7%) and through the media (6.8%).

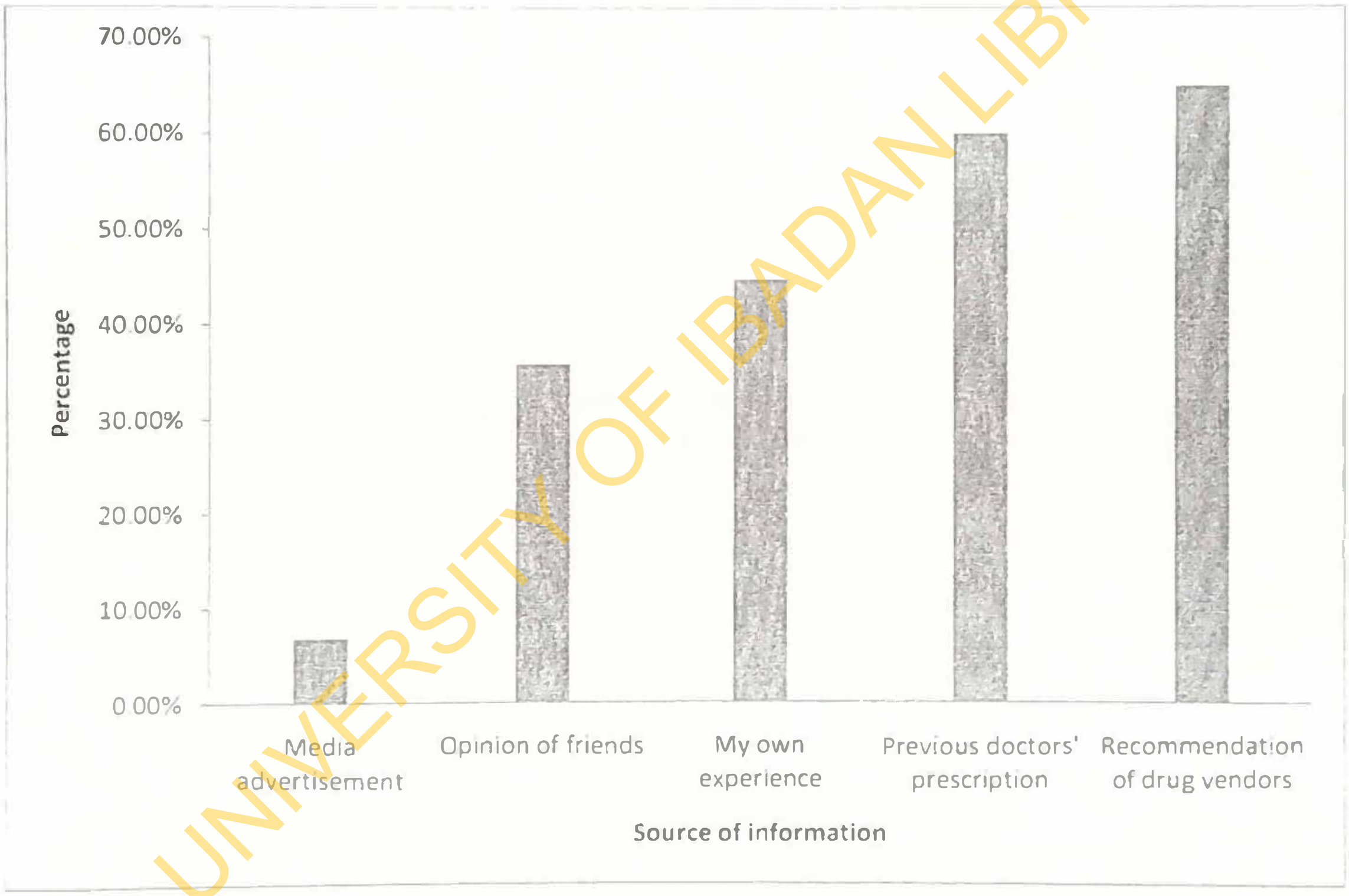

Fig.4.1: Respondents' source of antibiotics information

4.5 Health conditions treated with antibiotics

Mothers self-medicate their under-five children with antibiotics for various health conditions such as; cough (66.1%), fever (42.5%), diarrhea (28.8%), running nose (18.7%). Other health conditions included; ear discharge (0.6%), eye discharge (0.4%) and rashes (5.6%). The result is shown in the table 4.4 below.

Table 4.4: Health conditions treated with antibiotics

Conditions	Frequency	Percentage (%)
I don't treat my child with antibiotics on my own	13	2.5
Running nose	96	18.7
Fever	218	42.5
Cough	339	66.1
Diarrhea	148	28.8

*Others were: ear discharge 3(0.6%), eye discharge 2(0.4%) and rashes 29(5.6%).

4.6 Reasons for self-medicating under-five children with antibiotics

Several reasons given for antibiotic self-medication (Table 4.5). The major reasons were the distance of health facility (82.1%), ease of procuring antibiotics (69.4%), seriousness of child's condition (67.1%), belief that antibiotics can be administered in all sickness (61.4%), availability of left-over antibiotics at home (58.3%) and the belief that over-the-counter antibiotics are more effective than the prescribed ones (56.7%).

Table 4.5: Reasons for self-medicating under-five children with antibiotics

Reasons	Frequency	Percentage (%)
I believe that antibiotics can be administered in all cases once a child is sick	315	61.4
I thought my child's condition was not serious	344	67.1
I have some antibiotics left over at home	299	58.3
It is convenient to buy antibiotics over the counter	356	69.4
Because the public health centre is too far	421	82.1
Over the counter antibiotics are more effective	291	56.7

4.7 Knowledge on hazards of antibiotics self-medication

Questions were asked from the respondents on the hazards of antibiotic self-medication. Slightly more than half (55.8%) stated that antibiotics have no side effects, while 44.8% had heard about antibiotics resistance. Only 7.4% could correctly explain the meaning of antibiotics resistance. Also, 36.6% knew that antibiotics self-medication could lead to antibiotics resistance while 50.9% knew that some germs are becoming harder to treat with antibiotics. The result is highlighted in table 4.6 below.

Table 4.6: Knowledge on hazards of antibiotics self-medication

Questions	Yes	(%)	No	(%)
Antibiotics do not have side effects.	236	(55.8)	227	(44.2)
Have you heard about antibiotics resistance?	230	(44.8)	283	(55.2)
If yes, what is antibiotics resistance?	38	(7.4)	475	(92.6)
Self-medication with antibiotics increase the risk of resistance.	188	(36.6)	325	(63.4)
Some germs are becoming more difficult to treat with antibiotics.	261	(50.9)	252	(49.1)
Self-medication with antibiotics could have an adverse effect.	246	(48.0)	267	(52.0)

4.8 Knowledge score on the hazards of antibiotics self-medication

The knowledge of mothers' on the hazards of antibiotics self-medication was obtained by scoring six questions. Each correct response attracted one point while a wrong response was awarded zero point. The total score obtainable was six points and any respondent who scored 4 points and above was assumed to have a good knowledge of the hazards of antibiotic self-medication. Of the 513 mothers that were interviewed, 28.1% had a good knowledge of the hazards of antibiotic self-medication.

4.9 Association between socio-demographic variables of respondents' and knowledge of hazards of antibiotics self-medication

When the association between socio-demographic variables; (age, marital status, educational status, respondents' occupation, spouse occupation, spouse educational status, religion, number of children raised and age of little child) and knowledge of hazards of antibiotics self-medication were examined using Chi-square test with the level of significance set at 0.05, it was observed that respondents' educational status ($P<0.05$), occupation ($P<0.05$), religion ($P<0.05$), spouse educational status ($P<0.05$) and spouse occupation ($P<0.05$) had significant association with knowledge on hazards of antibiotics self-medication (Table 4.7).

Table 4.7: Bivariate analysis of the association between socio-demographic variables of respondents' and knowledge of hazards of antibiotics self-medication.

Variables	Good knowledge (n=144) Freq. (%)	Poor knowledge (n=369) Freq. (%)	P-value
Age (yrs)			
15-24	9(18.8)	39(81.2)	0.35
25-34	68(30.5)	155(69.5)	
35-44	61(28.5)	153(71.5)	
45 and above	6(21.4)	22(78.6)	
Marital status			
Currently Married	142(28.9)	350(71.1)	0.08
Not currently married	2(9.5)	19(90.5)	
Educational status			
No formal education	2(5.0)	38(95.0)	0.00
Primary	15(14.3)	90(85.7)	
Secondary	52(19.2)	219(80.8)	
Tertiary	75(77.3)	22(22.7)	
Occupation			
Professional	60(85.7)	10(14.3)	0.00
Skilled labour	54(19.6)	222(80.4)	
Unskilled labour	15(14.3)	90(85.7)	
Unemployed	15(24.2)	47(75.8)	
Spouse occupation			
Professional	71(80.7)	17(19.3)	0.00
Skilled labour	65(19.0)	278(81.0)	
Unskilled labour	6(8.3)	66(91.7)	
Unemployed	2(20.0)	8(80.0)	

Spouse educational status			
No formal education	0(0.0)	17(100.0)	0.00
Primary	8(14.3)	48(85.7)	
Secondary	50(16.1)	261(83.9)	
Tertiary	86(66.7)	43(33.3)	
Religion			
Islam	55(20.6)	212(79.4)	0.00
Christianity	89(36.2)	157(63.8)	
Number of children raised			
1-4	125(29.1)	304(70.9)	0.24
5-7	19(22.6)	65(77.4)	
Age of children			
0-11mths	7(25.9)	20(74.1)	0.80
12-23mths	79(29.4)	190(70.6)	
≥24months	58(26.7)	159(73.3)	

4.10 Effects of socio-demographic variables of respondents' on knowledge of hazards of antibiotics self-medication

To identify the effect of socio-demographic variables on knowledge of hazards of antibiotics self-medication, the socio-demographic variables were subjected to multivariate logistic regression analysis. The results (Table 4.8) showed that respondents with age range between 15-24years were less likely to be knowledgeable on the hazards of antibiotics self-medication than those with age range between 45 years and above (OR=0.84; 95%CI= 0.19-3.53), currently married respondents' were more likely to be knowledgeable compared to those that were not currently married (OR=2.99; 95%CI= 0.51-17.59). Also, moslems were less likely to be knowledgeable on the hazards of antibiotics self-medication than their Christian counterparts (OR=0.92; 95%CI= 0.56-1.53). Mothers with no formal education were less likely to have good knowledge of the hazards of antibiotics self-medication compared to those with tertiary education (OR=0.08; 95%CI= 0.02-0.57). On the other hand, mothers who were professionals were more likely to have good knowledge of the hazards of antibiotics self-medication than unemployed (OR=1.68; 95%CI= 0.45- 6.30). Mothers whose spouse were professionals were also more likely than those mothers whose spouse were unemployed to have good knowledge of the hazards of antibiotics self-medication (OR=1.66; 95%CI=0.24-11.63).

Table 4.8: Logistic regression analysis of the effect of socio-demographic variables on knowledge of the hazards of antibiotics self-medication

Variables	Good knowledge (n=144) Freq. (%)	Poor knowledge (n=369) Freq. (%)	Odds ratio (95%CI)
Age (yrs)			
15-24	9(18.8)	39(81.2)	0.84(0.19-3.53)
25-34	68(30.5)	155(69.5)	0.71(0.22-2.31)
35-44	61(28.5)	153(71.5)	0.79(0.25-2.44)
45 and above **(Ref)**	6(21.4)	22(78.6)	
Marital status			
Currently Married	142(28.9)	350(71.1)	2.99(0.51-17.60)
Not currently married **(Ref)**	2(9.5)	19(90.5)	
Educational status			
No formal education	2(5.0)	38(95.0)	0.08(0.01-0.47)
Primary	15(14.3)	90(85.7)	0.26(0.07-0.91)
Secondary	52(19.2)	219(80.8)	0.33(0.12-0.96)
Tertiary **(Ref)**	75(77.3)	22(22.7)	
Occupation			
Professional	60(85.7)	10(14.3)	1.68(0.45-6.30)
Skilled labour	54(19.6)	222(80.4)	0.72(0.33-1.54)
Unskilled labour	15(14.3)	90(85.7)	0.69(0.29-1.71)
Unemployed **(Ref)**	15(24.2)	47(75.8)	
Spouse occupation			
Professional	71(80.7)	17(19.3)	1.66(0.24-11.63)
Skilled labour	65(19.0)	278(81.0)	0.51(0.09-2.77)
Unskilled labour	6(8.3)	66(91.7)	0.19(0.03-1.29)
Unemployed **(Ref)**	2(20.0)	8(80.0)	

Spouse educational status			
No formal education	0(0.0)	17(100.0)	0.00(0.00)
Primary	8(14.3)	48(85.7)	0.51(0.15-1.71)
Secondary	50(16.1)	261(83.9)	0.62(0.26-1.46)
Tertiary (**Ref**)	86(66.7)	43(33.3)	
Religion			
Islam	55(20.6)	212(79.4)	0.92(0.56-1.53)
Christianity (**Ref**)	89(36.2)	157(63.8)	
Number of children raised			
1-4	125(29.1)	304(70.9)	0.49(0.24-1.02)
5-7 **(Ref)**	19(22.6)	65(77.4)	
Age of children			
0-11mths	7(25.9)	20(74.1)	0.50(0.13-1.86)
12-23mths	79(29.4)	190(70.6)	0.96(0.54-1.68)
≥24months (**Ref**)	58(26.7)	159(73.3)	

CHAPTER FIVE

DISCUSSION

5.0 Discussion

5.1 Pattern of antibiotics self-medication for under-five children

The results from this study gives insights into the level at which under-five children were self-medicated with antibiotics. This study showed that a very high proportion of mothers (96.5%) in this rural community relied on self-medication for the health care of their under-five children. This prevalence of antibiotics self-medication was higher than that obtained by Adedire et al, 2013 in a study conducted to determine the home-care practices towards childhood febrile illnesses amongst the mothers or caregivers who accompanied their under-five year old children to selected health facilities in Osun state. The prevalence in this study was also higher than those of previous studies in rural China (Miao et al., 2014), urban area of China (Miao et al., 2014), suburban areas of Greece (Miao et al., 2014), and Turkey (Akici et al., 2004). However, the result of this study was similar to that of the previous study conducted in Peru in which the prevalence of antibiotics self-medication for under-five children was found to be 87.2% (Ecker et al., 2013). Any response to illness depends on the ability of caregivers to correctly recognize signs and symptoms and to evaluate the seriousness of those indicators once recognized (Afolabi et al., 2004). The result of this study showed that the practice of antibiotics self- medication for under-five children by their mothers is a serious problem in our society which needs urgent attention.

The type of antibiotics used for self-medication of under-five children varies from one community to another. The most commonly used antibiotics in this study were Septrin, followed

by Flagyl and Amoxicillin probably because of their low cost. This differs from the result of previous study that was conducted in Vietnam in which Amoxicillin was found to be the most commonly used antibiotics for self-medication of under-five children (Le et al., 2011). Despite the highly harmful effect of tetracycline, the result of this study revealed that some mothers still use it in the treatment of diarrhea in their under-five children. Tetracycline causes depression of bone growth, permanent discoloration of teeth and enamel hypoplasia when given during teeth and skeletal development. Thus, it is not supposed to be used for children less than eight years (Versalovic et al., 2011). The health conditions for which mothers self-medicated their children with antibiotics included; cough, fever, diarrhea and running nose. This was similar to the result from previous study conducted in a rural village in Philippines which revealed that antibiotics were routinely given in self medication for non-severe childhood diarrhea illness (Justice et al., 2010). This practice encourages the development of antibiotic resistant bacteria as diarrhea is self-limiting and often needs no antibiotics.

Also, the main source of antibiotics information was the drug hawkers or sellers. This further corroborates the findings of previous studies that patent medicine vendors were the major source of antibiotics used for self-medication (Afolabi et al., 2004). Friends and relations were also stated as source of information on antibiotics. This was similar to the result from Phillipines, India, Mexico and Brazil in which drug store customers based their decision to buy antibiotics on friends or relatives advice (Radyowijati et al., 2002). Consequences of this were abuse of antibiotics which encourages development of bacteria resistance, adverse drug reactions, medication errors and waste of resources for both patient and the country (Savadogo et al., 2014).

5.3 Mothers' knowledge on the hazards of antibiotics self-medication

The high prevalence of antibiotics self-medication for under-five children may be attributed to the low level of knowledge of mothers on the possible hazards of antibiotics self-medication. Majority of the mothers did not have a good knowledge of the hazards of antibiotics self-medication. The knowledge score reported in this study was lower compared to that reported in the studies conducted in United States of America and Nepal (Lawan et al., 2013). On the other hand, it was closer to the level of knowledge reported from studies conducted in Ethiopia, India, Turkey and the Southern part of Nigeria (Lawan et al., 2013). Although, antibiotics have a significant role in the reduction of morbidity and mortality rates worldwide, their increasing inappropriate consumption leads to the development of bacterial resistant strains and such resistance to antibiotics is likely to lead to reduction in the effectiveness of many antibiotics (Arwa et al., 2011). Moreover, antibiotics resistance places both populations and individuals at risk. Studies have confirmed that the emergence of bacterial resistant strains leads to significant economic loss due to longer length of hospital stay and higher cost of treatment of patients with bacterial resistance infections (Emanuele, 2010). The result from this study also showed that majority of the mothers had never heard about antibiotics resistance nor new that antibiotics self-medication could lead to an adverse drug effect. Antibiotics self-medication of under-five children could result into serious adverse effects such as: adverse gastrointestinal effects, drowsiness, hyperactivity and also erythema multiforme which is an adverse drug reaction attributed to ampicillin (Arwa etal., 2011). Adverse drug reactions (ADR) have also been reported as a cause of death in children (Oshikoya et al., 2007). Problems associated with antibiotics self-medication for children emphasized the need to educate mothers and the entire community on the consequence of antibiotics self-medication. The significant association

between the level of education of mothers' and the knowledge of the hazards of antibiotics self-medication found in this study further corroborates the findings of Arturo et al., (2013) that education of mothers has a greater protective effect in their children. Mothers that had more than secondary education were more likely to be more knowledgeable on the hazards of antibiotics self-medication. Thus, efforts to promote schooling and the educational level of women and girls will have a protective effect on the child's health.

5.4 Factors influencing antibiotics self-medication for under-five children

The problem of antibiotics self-medication for under-five children may be influenced by several contributing factors. According to the result of this study, the factors include;

5.4.1 Long distance to a Public Health Centre

Long distance of a Public Health facility was a common reason why the mothers self-medicate their children with antibiotics. This showed the uneven or sparse distribution of Primary health care centers especially in rural areas of Nigeria. In Nigeria, over 70% of inhabitants live in rural communities yet, the area has not attracted sufficient health facilities or projects that would substantially improve the health need of the rural dwellers (Efe, 2013). Most health facilities are concentrated in urban areas (Ajilowo et al., 2007). This finding corroborates result of a study by Bamgboye et al., (2006) in which inaccessibility to health facility was reported as the leading reasons for self-medication. Health accessibility is the ability of an individual or community to obtain healthcare services with ease (Ajilowo et al., 2007) and the essence of healthcare to the local government is to make the management of Public Health services more effective and closer to the grassroots (Abdulraheem et al., 2012).

5.4.2 Convenience of purchasing antibiotics over-the-counter

Convenience of purchasing antibiotics from drug hawkers or sellers was also another factor found to contribute to self-medication. This further corroborates the result of previous study on the pathway of care for sick children in three rural Nigerian communities in which patent medicine vendors was the most popular first choice of care for most families who sought treatment for their sick children (Afolabi et al., 2004). This result also agreed with the findings of Rosamund et al., (2012) who stated that patent medicine vendors are patronized by great number of people in both rural and urban areas. Though, they are not recognized as a part of the formal health system, parents consult them on childhood illness for which they give advice, prescribe or sell drugs (Rosamund et al., 2012).

5.4.3 Perception of child's illness

Mothers' perception of the illness in the children influences the care. A number of mothers who practiced antibiotics self-medication for their under-five children in this study were found to have a wrong perception of their child's illness. Majority of whom thought that antibiotics could be administered in all cases once a child is sick and some mothers even administered antibiotics to treat their children's minor illnesses. This further corroborates the result from previous studies. for example: Thi et al., (2011) stated that mothers often practice self-medication when they think the illness is minor and the onset of the symptoms or the episode is similar to a previous one. Also, Miao et al, (2014) in a study conducted in rural China found that 79% of parents thought that antibiotics could cure infections caused by viruses. Parents' misconceptions about appropriate indication for antibiotics use leads to an increase in antibiotics self-medication for their children (Cheboterenco et al., 2007).

5.4.4 Availability of antibiotics left-over at home

In line with previous studies, a high proportion of respondents used home-stored antibiotics. Storing antibiotics left-over at home influences antibiotics self-medication (Togoobaatar et al., 2010). A global survey found that living in a country where antibiotics are dispensed in fixed-count packs rather than as the exact number of pills required is a strong predictor for possession of left-over antibiotics (Kardas et al., 2007). Stopping treatment earlier than prescribed is another source of left-over antibiotics since most people belief that antibiotics should be withdrawn as soon as the symptoms disappeared, a practice which increases the risk of relapse and the development of resistant pathogens (Miao et al, 2014).

5.5 Limitation of the study

This study has some limitations because this is a survey of self-reported information on events that had taken place during the child's life thus, may be subjected to recall bias. However, this was reduced by limiting the recall period to six months prior to the study. Also, the findings of this study may not be generalizable to urban settings as a result of differences in socio-economic and demographic characteristics.

CHAPTER SIX

Conclusion and Recommendation

6.1 Conclusion

The result of this study showed that the prevalence of antibiotics self-medication for under-five children in this rural community is alarming and the antibiotics commonly used for the treatment of minor health conditions include; Septrin, Amoxycillin, Ampicillin, Flagyl, Chloramphenicol, Gentamicin, Augmentin, Tetracycline and Ampiclox. Majority of mothers in this community also lack knowledge on the hazards of antibiotics self-medication. Religion, respondents' educational status, respondents' occupation, spouse educational status and spouse occupation were the socio-demographic characteristics found to be significantly associated with the level of knowledge of the hazards of antibiotics self-medication. Factors which influences antibiotics self-medication for under-five children by their mothers were; wrong perceptions about the child's illness, availability of antibiotics over-the-counter, long distance of Primary Health Centre, lower level of education of mothers and low level of knowledge on the hazards of antibiotics self-medication.

6.2 Recommendations

Based on the findings of this study, the following recommendations are made to reduce the habits of antibiotics self-medication for under-five children in our rural communities:

1. Mothers and the general public should be educated on the risks and side effects of antibiotics self-medication

2. The Pharmacist Council of Nigeria, National Agency for Food and Drug administration and Control (NAFDAC) and stakeholders should prohibit the sale of unprescribed antibiotics by the drug hawkers or sellers.
3. The law and regulations guiding the sale and use of antibiotics in Nigeria should be strengthened.
4. Mothers should be encouraged to consult a Clinician before treating a child's illness.
5. The Federal, State and Local Government in Nigeria should establish and equip Primary Health Centre in our rural areas as this will go a long way in reducing self-medication and its consequences.

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APPENDIX I

MINISTRY OF HEALTH

DEPARTMENT OF PLANNING, RESEARCH & STATISTICS DIVISION

PRIVATE MAIL BAG NO. 5027, OYO STATE OF NIGERIA

Your Ref. No. .....

All communications should be addressed to

the Honorable Commissioner quoting

Our Ref. No. AD 13/ 479/ 714

November, 2014

The Principal Investigator,
Department of Epidemiology & Medical Statistics,
Faculty of Public Health,
University of Ibadan,
Ibadan.

Attention: Akinlade Kafayat

Ethical Approval for the Implementation of your Research Proposal in Oyo State

In response of your letter requesting for Renewal of your Research Proposal tittled: "Pattern and Determinants of Antibiotics Self- Medication for Under-Five Children in a Rural Community of South-Western Nigeria."

2. The committee has noted your compliance with all the ethical concerns raised in the initial review of the proposal. In the light of this, I am pleased to convey to you the approval of committee for the implementation of the Research Proposal in Oyo State, Nigeria.

3. Please note that the committee will monitor closely and follow up the implementation of the research study. However, the Ministry of Health would like to have a copy of the results and conclusions of the findings as this will help in policy making in the health sector.

4. Wishing you all the best.

OYO STATE RESEARCH ETHICAL REVIEW COMMITTEE
Signature & Date

Sola Akande (Dr)
Director, Planning, Research & Statistics
Secretary, Oyo State, Research Ethical Review Committee

APPENDIX 2

INFORMED CONSENT

My name is Akinlade, Kafayat Abosede. I am a second year student of the Department of Epidemiology & Medical Statistics, Faculty of Public Health, University of Ibadan, Ibadan. Irrational use of antibiotics has become a common practice in developing countries where the prevalence of infectious disease burden is aggravated by uncontrolled access to antibiotics. In this context, it's important that we recognize those factors that influence this practice and implement prevention programme against it. Hence, we are interviewing mothers of under-five children in this community to identify the pattern and determinants of antibiotics self-medication for under-five children and also assess their knowledge about the hazards of this practice. This will provide useful information to the policy makers. In the course of interview, we will ask you questions and we are assuring you that all the information you give will be kept highly confidential and will not be used against you in any form. The study will in no way cause you any harm or risk. Your honest response to the various questions is highly solicited. Please, note that you are free to refuse to participate in this study. You have the right to withdraw from the study at any time if you choose to. We will greatly appreciate your help in responding to the survey and taking part in the study.

Consent: Now that the study has been well explained to me and I fully understand the content of the study procedure, I will be willing to take in the study.

....

Signature/Thumb print of Participant Interview Date

APPENDIX 3

Title: Questionnaire on pattern and determinants of antibiotics self-medication for under- five children in a rural community of South- Western Nigeria.

Dear mothers,

This questionnaire is meant to collect information on the pattern and determinants of antibiotic self- medication in under- five children by the mothers or caregivers in this community. Your honest response which shall be treated with utmost confidentiality is highly solicited.

Serial number _____

Section A: Socio- demographic characteristics

1. Age (years) _____

2. Marital status: (1) Married ☐
   (2) Separated ☐
   (3) Divorced ☐
   (4) Widowed ☐

3. Educational status: (1) No formal education ☐ (2) Primary ☐
   (3) Secondary ☐ (4) Tertiary ☐

4. Occupation: (1) Professional ☐
   (2) Skilled labour ☐
   (3) Unskilled labour ☐
   (4) Unemployed ☐
   (5) Others (specify) _____

5. Spouse's occupation: (1) Professional ☐ (2) Skilled labour ☐
   (3) Unskilled labour ☐ (4) Unemployed ☐
   (5) Others (specify) _____

6. Spouse's educational status: (1) No formal education ☐ (2) Primary ☐
   (3) Secondary ☐ (4) Tertiary ☐

7. Religion: (1) Islam ☐

(2) Christianity ☐ (3) Traditional ☐

8. How many children have you raised? _____

9. How old is your little child? _____

Section B: Antibiotics self- medication behavior for under- five children.

10. Have you heard about antibiotics? ☐ Yes ☐ No

11. What was your source of information? (1) Friends or relations ☐ (2) Doctor ☐

(3) Medicine vendors ☐ (4) Media ☐ (5) others (specify) _____

12. What are antibiotics used for? _____(1) Viral infections(2) Bacteria infections (3) Parasites

13. Have you ever bought antibiotics on your own? ☐ Yes No ☐

14. Who prescribed the antibiotics for you? (1)Doctor ☐ Pharmacist ☐

(3) Medicine vendor ☐ (4) others (specify) _____

15. Who used the antibiotics you bought? (1) Self ☐ (2) My child ☐ (3) My Spouse ☐

16. Do you normally treat your children with antibiotics on your own? ☐ Yes ☐ No

17. For which of the following conditions did you treat your under- five children with antibiotics on your own? (Tick as many options as applicable)

(1) Running nose ☐

(2) Fever ☐

(3) Cough ☐

(4) Diarrhea ☐

(5) Others (specify) _____

18. How often do you normally give your under- five children antibiotics on your own?

(1) Always ☐ (2) Often ☐ (3) Never ☐

(4) Not sure ☐

19. Please state the name(s) of antibiotics you normally use. (1) _____

(2) _____ (3) _____ (4) _____

20. What do you normally consider when selecting antibiotics?

(1) Type of antibiotics ☐

(2) Price of antibiotics ☐

(3) Others (specify) _____

21. Your selection of antibiotics was based on _____ (Tick as many options as applicable)

	Yes	No
(1) Opinion of friends	☐	☐
(2) My own experience	☐	☐
(3) Recommendation by drug hawker or seller	☐	☐
(4) Through media advertisements	☐	☐
(5) Previous doctor's prescription	☐	☐

Section C: Factors which influence antibiotics self- medication for under- five

Please tick the reason(s) for giving your under- five children antibiotics without doctor's advice.

	Yes	No
22. I believe that antibiotics can be administered in all cases once a child is sick.	☐	☐
23. I thought that my child's condition was not serious enough.	☐	☐
24. I have some antibiotics left over at home.	☐	☐
25. It is convenient to purchase antibiotics over the counter.	☐	☐
26. Because the public health centre is too far.	☐	☐
27. Over the counter antibiotics are more effective.	☐	☐

Section D: Mothers knowledge about hazards of antibiotic self- medication.

28. Antibiotics do not have any side effects. ☐ Yes ☐ No

29. Have you heard about antibiotics resistance? ☐ Yes ☐ No

30. If yes, what do you know about antibiotics resistance? _____

31. Self- mediation with antibiotics increases the risk of antibiotic resistance ☐ Yes ☐ No

32. Some germs are becoming harder to treat with antibiotics? ☐ Yes ☐ No

33. Self-medication with antibiotics could have an adverse effect. ☐ Yes ☐ No

Thank you for your cooperation and I wish you and your family the best!