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UNIVERSITY OF GHANA

SCHOOL OF PUBLIC HEALTH

COLLEGE OF HEALTH SCIENCES

FACTORS INFLUENCING THE USE OF ANTIBIOTICS AMONG ADULTS IN THE GREATER ACCRA METROPOLIS

BY

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INTEGRI PROCEDAMUS

THIS THESIS IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF PUBLIC HEALTH (MPH) DEGREE

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DECLARATION

This is to declare that this dissertation is the result of my own independent research undertaken under supervision. Published literatures of other researches which have been cited have been duly acknowledged with references.

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Date……..…………………..	Date …..…………………....

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DEDICATION

This dissertation is dedicated to my mother, Beatrice Owusu who ensures that I am always a go-getter.

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ACKNOWLEDGEMENT

I am grateful to God for seeing me through this course. My immense gratitude also goes to my husband and my kids for their support, encouragement and prayers throughout this course.

To my supervisor, I say ayekoo for your constructive comments and pushing me to bring the best out of this research within time.

My gratitude also goes to all the data collectors and participants who worked tirelessly with me under such short notice to make this research a reality.

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DEFINITION OF TERMS

Term	Definition
Antibiotics	Antibiotics are agents used to treat or prevent infectious diseases caused by bacteria; with a few of them having activity against protozoa.
Antibiotic resistance	Antibiotic resistance is a situation that occurs when bacteria develops resistance to antibiotics to which they were once sensitive to.

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LIST OF ACRONYMS

ARS	Antibiotic-Resistant Strain
CDC	Centers for Disease Control and Prevention
DDD	Define Daily Dose
ECDC	European Centre for Disease Control and Prevention
EU	European Union
FDA	Food and Drugs Authority
NPAR	National Platform on Antimicrobial Resistance
NAP	National Action Plan
PHC	Population and Housing Census
UK	United Kingdom
WEF	World Economic Forum
WHO	World Health Organization

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ABSTRACT

Introduction: Antibiotic resistance is a global public health issue. Although antibiotic resistance will suffice naturally over time, increased use/misuse of antibiotics escalates the process. In Ghana there is a dearth of studies exploring the relationship between knowledge, attitude and practices on consumption of antibiotics by individuals within the community. The objective of this study was to determine the factors influencing antibiotic use among adults within the Greater Accra Metropolis in Ghana.

Method: A cross-sectional analytical study design using interviewer-administered questionnaire was conducted in twenty communities of the Greater Accra Metropolis. A total of 470 participants were interviewed. The questionnaire assessed level of antibiotic use, knowledge and attitude towards antibiotic use and resistance. Descriptive analysis, bivariate and multivariate logistic regression using Stata version 15.0 was used to analyze the data.

Results: Among the 470 respondents, 93.4% (n=439) had ever used antibiotics. The most commonly used antibiotic was Augmentin/Amoksiklav. About 71.1% (n=312) purchased the antibiotics with prescription, while 47.2% (n=207) of the respondents obtained their antibiotics from the hospital. About 27.3% (n=120) of the antibiotic users used the antibiotics to treat pain, toothache (16.2%, n=71), sore throat (14.1%, n=62), and fever (13.9%, n=61). The knowledge rating of respondents on antibiotic use and antibiotic resistance was about 90.0% with a mean score of 63.1% ± 13.9%. Majority (94.6%) of the respondents had good attitudes towards antibiotic use. The use of antibiotics was significantly associated with the age categories ($\chi^2 = 17.339, p = 0.001$). Highest level of education and the employment status of the respondents were also both significantly associated with the use of antibiotics, ($\chi^2 = 32.3125 , p < 0.001$) and ($\chi^2 = 17.9588, p < 0.001$) respectively. Area of residence and the insurance status of respondents also showed significant association with the use of antibiotics, ($\chi^2 = 12.5591 , p = 0.014$) and ($\chi^2 = 4.6405, p < 0.031$) respectively. Multivariate analysis showed that females were more likely than males to use antibiotics (AOR 1.53, 95% CI 0.64-3.65). Participants with tertiary level of education were more likely to use antibiotics compared to those with no education (AOR 8.35, 95% CI 0.54-128.72). Manual workers used more antibiotics compared to the unemployed (AOR 3.48, 955 CI 1.11-10.87). Highest level of education, area of residence and manual worker were

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significantly associated with antibiotic use
($p < 0.001, p < 0.001$ *and* $p < 0.032$ *respectively*)

Conclusion: The number of people using antibiotics is still high despite efforts by the Ministry of Health to educate the public on antibiotic use and resistance. Most of the respondents purchased the antibiotics using a prescription and used it to treat pain, a condition for which antibiotics is not medically indicated. Overall, many people however had good knowledge and attitudes towards duration and side effects of antibiotic use.
Highest level of education and area of residence were significantly associated with the use of antibiotics.

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CHAPTER ONE

INTRODUCTION

1.1. Background of Study

The discovery and development of antibiotics has contributed immensely towards the treatment and prevention of bacteria infections. Antibiotics being the mainstay drug for bacteria infections have resulted in some bacteria developing resistance through various mechanisms. The development of this resistance has rendered many antibiotics ineffective and new and expensive antibiotics have to be developed to curb this menace (Laxminarayan et al, 2013). In developing countries, antibiotics are amongst the most commonly consumed drugs (Frieden, 2013; Togoobaatar et al., 2010; WHO, 2015). In developing countries, an estimated 35% of the annual health budget is spent on antibiotics (Isturiz& Carbon, 2000, cited in Makhado, 2009). Globally, the problem of antibiotic resistance is on the rise as a result of globalization and migration which leads to spread of bacteria resistance (WHO, 2015). The WHO defines antibiotic resistance as the ability of bacteria or other microbes to resist the effect of antibiotic even in the presence of therapeutic amounts of the antibiotic (WHO, 2015; Davies et al., 2010).

The development of antibiotic resistance complicates treatment, increases cost of treatment, morbidity and mortality (WEF, 2013). A positive correlation between consumption of antibiotic and development of antibiotic-resistant strain has been established in many studies (Goossens et al., 2005). Consumption of antibiotics also exposes individuals to risks of adverse effects which the individual may have no knowledge of. A vicious cycle of antibiotic consumption can arise with individuals taking more antibiotics to treat these adverse effects which can be perceived as

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‗new diseases'. The global increase in the consumption of antibiotics with resultant increase in development of resistance has become such a huge national and global public health issue to the extent that the WHO in 2001, developed a global strategy for the containment of antimicrobial resistance. Controlling the consumption of antibiotics at the patient and community level especially in developing countries is one of the minimization strategies identified by the WHO.

The inappropriate and unwarranted exposure to antibiotics predisposes individuals and the community at large to the possible development of antibiotic resistance (Huttner et al, 2010).

The prevalence of antibiotic consumption varies from geographical locations (Haggett, 1994) but generally higher in developing countries where antibiotics can be obtained without prescription and where access to quality healthcare is a problem. A study conducted in the Cape Coast Metropolis identified about 71.5% of the population did not visit any healthcare facility when ill (Tagoe et al., 2010). A Jordanian study reported that about 46% of people purchase antibiotics without prescription (Al-Bakari et al, 2005). Different reasons have been attributed to the increase in consumption of antibiotics including self-medication, prescribing patterns of physicians, knowledge about the use of antibiotics and development of antibiotic-resistant strains amongst others.

In Ghana, the National Drug Regulatory Authority recommends that antibiotics be sold and distributed only on a valid prescription. The prevalence of infectious disease in Ghana and most developing countries is high thereby increasing the consumption of antibiotics. A lot of antibiotics are purchased and consumed within the community without prescription. In most communities within Ghana, antibiotics are purchased and used than medically indicated (Tagoe

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et al., 2010). This study therefore sought to determine the factors that influence the consumption of antibiotics within the community among adults residing in the Greater Accra Metropolis.

1.2. Statement of the Problem

Globally the use of antibiotics is on the rise with resultant increase in development of resistant bacteria. An individual‘s chance of dying from infection caused by antibiotic-resistant bacteria is about twice that compared to infections caused by non-resistant strains of the same bacteria (ECDC, 2011).

An estimated 23,000 people die annually in the United States of America (CDC) with two million new cases of infections due to antibiotic-resistant bacteria per year. In Europe, about 25,000 people die annually from infections due to antibiotic-resistant bacteria whiles the overall cost to society from treatment due to antibiotic-resistant bacteria is about 1.5 billion Euros per year. In Europe an estimated 2.5 million extra hospital days is due to antibiotic-resistant bacteria (ECDC, 2011).

In developing countries, antibiotics alone contribute to about 35% of the annual health cost budget (Isturiz & Carbon, 2000).

This pattern of bacteria resistance due to the level of consumption of antibiotics is affected by many factors, some of which are restricted to a geographical setting (Haggett, 1994). The prescription patterns of doctors, pricing, advertisement, access to quality and affordable healthcare, socio-economic factors and lack of enforcement of regulatory policies on distribution and sale of antibiotics are some of the contributory factors to development of antibiotic resistant bacteria strains (WHO, 2015). In Ghana even though the National Drug Regulatory Authority (FDA) recommends that antibiotics be sold only on a valid prescription, majority of antibiotics

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can be obtained from most community pharmacies and chemical shops without prescription. Most individuals do not access hospitals when sick, with majority purchasing drugs from community pharmacies and licensed chemical shops (Aryee et al, 2009/2010). A 60.7% use of antibiotics was established in the government health facilities within the Wassa district (Bosu et al., 2000). Boadu et al in 2014 also found that about 82% of prescriptions contain antibiotics. A study in the Cape Coast Metropolis using eleven community pharmacies found that about 80% of people use antibiotics (Tagoe et al., 2010).

The use of antibiotics if not controlled and restricted to medically indicated conditions will result in complete inefficacy due to increased antibiotic-resistant bacteria and a ‗post antibiotic era' where bacterial infections will no longer respond to treatment with antibiotics (WHO). When this situation occurs, the possibility of loss of lives due to infections caused by antibiotic-resistant bacteria will be huge impacting negatively on the national and global economy. The World Economic Forum's Global Risks 2013 report concluded that ―whiles viruses may capture more headlines; arguably the greatest risk to human health comes in the form of antibiotic-resistant bacteria" (WEF, 2013).

This study therefore sought to provide data which can inform policy/decision concerning antibiotic use within the community and contribute to the global fight against antibiotic resistance.

1.3. Justification of the Study

In the past 50 years the increasing use of antibiotics with resultant increase in antibiotic-resistant bacteria infection has become a global health concern (Gleckman et al., 1969). Over the years antibiotic-resistant bacteria has contributed significantly to the burden of infectious diseases and

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the total cost involved in the treatment of these diseases (So et al., 2010). In Ghana, data available on the consumption of antibiotics are mostly restricted to the hospital setting where guidelines for management and treatment of diseases are well documented. Data regarding the consumption of antibiotics within the community is limited. From literature, most of the studies on the use/misuse of antibiotics were performed using community pharmacies (Tagoe et al., 2010) or within the hospital setting (Bosu et al., 2000; Boadu et al., 2014) and none so far from literature explores the methodology of household survey. This study therefore sought to fill in the gaps on the factors influencing the use of antibiotics, knowledge, practices and attitudes of antibiotic users within the community setting using household survey.

1.3.1. Knowledge

According to the WHO the level of knowledge about the use of antibiotics and development of resistance is very low in most developing countries. Creating awareness on the development of bacterial resistance to antibiotics through public education could reduce the inappropriate use of antibiotics. Majority of individuals in developing countries cannot distinguish between antibiotics and other medications (Norris P, 2007). However, in the Ghanaian context, this issue remains unexplored.This study will thus fill this gap in the literature.

1.3.2. Attitudes/Practices

Globally, the consumption of antibiotics increased to about 36% from 2000 to 2010 (Van Boekel, 2014). The attitudes and/or practices of people towards the use of antibiotics have contributed significantly to this rise (Van Boekel, 2014). Many studies have been done globally to determine the effect of attitudes and practices of antibiotic users in relation to antibiotic

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consumption (You et al., 2008; McNulty et al., 2007). Self-medication either with left-over antibiotics or antibiotics purchased without prescription have all been found to be an important contributory factor to the rise in increase of antibiotic use with resultant development of antibiotic resistant bacteria strains (Tagoe et al, 2010; Wamola, 2002). In Ghana, there is available literature on the effect of knowledge, attitudes and practices of prescribers on the consumption of antibiotics by patients (Opuku et al., 2014) but not the individual user at the community level. This study therefore sought to address this gap.

1.4. Research Relevance

The understanding of antibiotic use is imperative in developing strategies and improving upon existing strategies of appropriate use of antibiotics within the community. Studying the patterns of use of antibiotics provides such information as who uses antibiotics, types of antibiotics used, ailments/symptoms for which antibiotics are used, reasons for use and the sources from which these antibiotics are obtained. The epidemiological information obtained from such studies is useful in understanding the problems of antibiotic use, identify possible causes and provide appropriate interventions (Green et al., 1980; Norris P, 2007). This study would provide data that would inform public health professionals and decision-makers on the current situation of antibiotic use within the community and hence help in the implementation of strategies to reduce antibiotic consumption and the resultant development of antibiotic resistance. This study would also provide information for use in educational campaigns aimed at reducing antibiotic use and development of resistance.

1.5 General Objective

The general objective of the study is to determine the factors influencing the use of antibiotics among adult residents in the Greater Accra Metropolis.

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1.6 Specific Objectives

The research intends to achieve the following specific objectives:

1. To describe the different types of antibiotics that are commonly consumed among adults in the Greater Accra Metropolis.
2. To assess the level of antibiotic consumption among adults in the Greater Accra Metropolis.
3. To evaluate the determinants of antibiotic consumption.
4. To examine individual's knowledge, practice and attitudes with regards to the use/misuse of antibiotics.
5. To determine what proportion of antibiotics consumed by individuals in this study was obtained with prescription as compared to over-the-counter.

1.7. Research Questions

The following research questions will help find answers to address the specific objectives:

1. What is the level of antibiotic consumption among adults in the Greater Accra Metropolis?
2. What are the common antibiotics and sources of antibiotics that are used among adults in the Greater Accra Metropolis?
3. What factors are likely to influence an individual's use of antibiotics?
4. What is the level of knowledge of antibiotics and antibiotic resistance in users?
5. What are the practices and attitudes of individuals with regards to antibiotic use?

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CHAPTER TWO

LITERATURE REVIEW

2.1 What are antibiotics?

Antibiotics are agents used to treat or prevent infectious diseases caused by bacteria; with a few of them having activity against protozoa. Antibiotics can be of natural or synthetic origin (Harvey et al., 1992). Antibiotics are not effective against viruses and hence are not indicated for use in viral infections. The first antibiotic *Penicillin notatum* was discovered by Sir Alexander Fleming in 1928 whiles experimenting with a culture plate of *Staphylococcus aureus* in the laboratory. Mass production of this penicillin was not commercially available until about 1942 (Aminov, 2010) leading to the ‗antibiotic era‘. Since the evolution of the ‗antibiotic era‘, antibiotics have played major role in the management and prevention of infectious diseases caused by bacteria. Antibiotics have played such a major role in health that many have come to see it as a ‗magic drug‘ that can cure ‗almost‘ all forms of diseases leading to overuse and hence the development of resistance. However antibiotics have no place in the treatment of viral infections (Harvey et al., 1992). Many people are also of the opinion that antibiotics are ‗safe drugs‘. Contrary to this, antibiotics can cause serious and life threatening side-effects including anaphylaxis and liver toxicity (Neugut et al., 2001; Katzung, 2009).

Antibiotics exhibit their effect by inhibiting or killing one or more of the following areas of the bacteria cell: cell wall, cell membrane, protein, nucleic acid or metabolic pathway. Antibiotics are usually classified by their mechanism of action. The beta-lactams inhibit cell wall synthesis and include the penicillins, cephalosporins, monobactams and carbapenems (Neu et al., 1996).

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Some antibiotics act by interrupting with protein synthesis of the bacteria and these include aminoglycosides, tetracyclines, macrolides, clindamycin, chloramphenicol and spectinomycins (Neu et al., 1996).The quinolone group of antibiotics acts through inhibition of DNA replication and include the sulphonamides and trimethoprims (Neu et al., 1996).

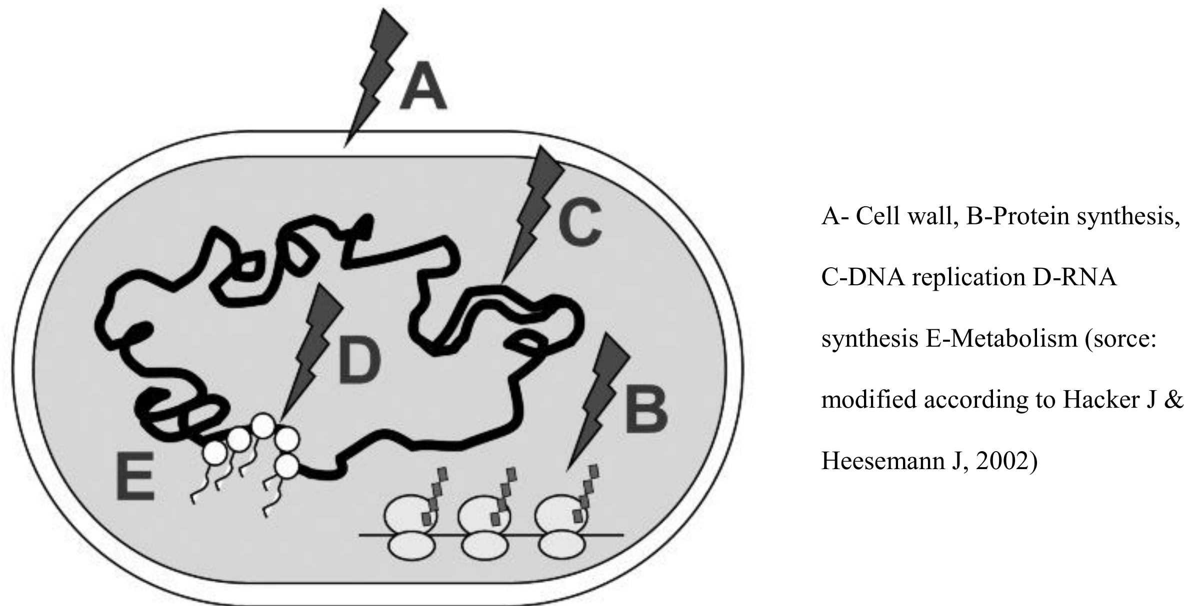

Figure 2.1: Antibiotic targets

2.2 Development of antibiotic resistance

Over the years bacteria have mutated genetically developing resistance against most of the available and commonly used antibiotics as a result of repeated use/misuse (D'Costa et al, 2011). According to the WHO, antibiotic resistance is a situation that occurs when bacteria develops resistance to antibiotics to which they were once sensitive to. Antibiotic resistance results from inappropriate use of antibiotics within the hospital and in the community setting.

The problem of antibiotic resistance is such a huge public health problem that the WHO developed the WHO 2012 _Options for action' to control development of antibiotic resistance.

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The antimicrobial option for action includes surveillance for bacterial resistance and antibiotic use, infection prevention, rational drug use, innovation and political support. An alarming number of infections such as gonorrhea, pneumonia and tuberculosis are becoming increasingly harder to treat with antibiotics due to bacteria resistant strains.

Bacteria resistance occurs through the following three ways: production of antibiotic inactivating enzymes, alteration of target structures and changes in permeability of cell wall (Shaw et al., 1993; Livermore, 1995; Lambert, 2002).

Bacteria resistance can be acquired or develop intrinsically (Livermore, 1995; Lambert, 2002). Bacteria can acquire resistance through gene mutation or acquisition of heterologous resistance genes (Neu et el., 1996; Lambert, 2002). Overuse of antibiotics therefore leads to increased development of bacteria resistant strains and a reduced antibiotic treatment efficacy (Davies et al., 2010). Multidrug-resistant bacteria use several of these mechanisms. Occurrence of this phenomenon overtime would lead to an era where antibiotics would no longer be effective and management or treatment of bacterial infections would be almost impossible leading to increased deaths, hospitalization and healthcare costs (Davis, 1995).

Some strains of bacteria that cause common infections within the community have developed resistance to antibiotics. *Streptococcus pneumoniae*, *Haemophilus influenza* are pathogens which cause respiratory infections that have shown increased resistance to standard therapy of antibiotics (Cohen, 1992).

A study to determine the factors associated with increased mortality in community-acquired pneumonia concluded that increased mortality was associated with penicillin and cefotaxime resistant pneumococcal bacteria (Feikin et al., 2000).

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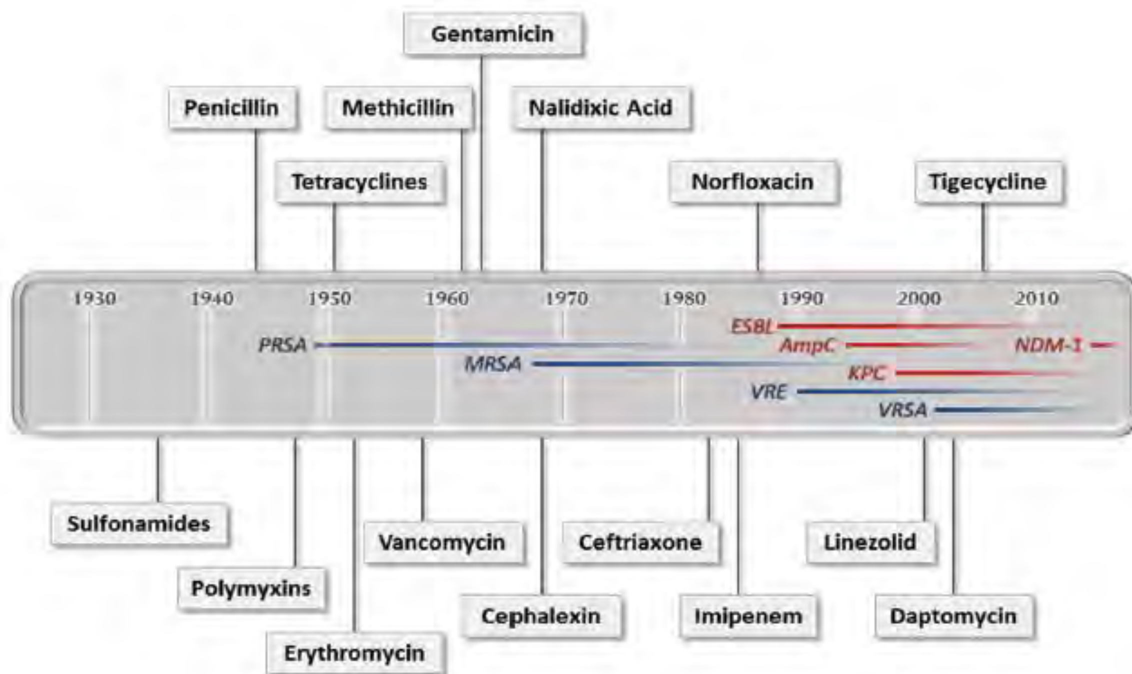
In Ghana, some studies concluded that bacteria resistance to antibiotics such as ampicillin, tetracycline, chloramphenicol and co-trimoxazole could be as high as 70% (Newman et al., 2011). From literature, one area that has been researched most when it comes to antibiotics is the prescribing habits of doctors. Most research into antibiotics also took place within the primary care setting. Little literature is available on the contribution of the patient to antibiotic consumption within the community setting. Many studies have established a positive correlation between antibiotic consumption and development of ARS (Goossens et al., 2005).

Globally, countries with high consumption of antibiotics have high rate of development of ARS (Bronzwaer Slam, 2002).

Below is a diagram showing the worldwide development of antibiotic resistance.



Source: Molton, 2013

Figure 2.2: Worldwide development of antibiotic resistance

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Most bacteria have developed resistance towards the older generation of antibiotics (Sulfonamides, penicillins etc) as a result of overuse and inappropriate use. By 1983, penicillin-resistant enterococcus had been discovered, Vancomycin-resistant enterococcus in 1987 and Linezolid-resistant enterococcus in the late 1990s (Molton, 2013).

2.3 Antibiotic use

2.3.1 Global use

A study which examined the total worldwide use of antibiotics (in-patient and out-patient) showed that there were differences in the way antibiotics were used across the different countries involved. The differences arose in both the purpose of antibiotic use as well as the types of antibiotics used. The study concluded that antibiotics constituted 3-5% of prescriptions in 1983 (Col et al., 1987). Emerging countries used more antibiotics than developed countries (Col et al., 1987) with emerging countries using tetracyclines and amoxicillins compared to ampicillin in developed countries (Col et al., 1987). A drug utilization study by McManus et al. comparing the retail sales of antibiotics across selected countries using the WHO‘s Defined Daily Dose approach showed the order of consumption of antibiotics of these countries from the highest to the lowest: France, Australia, United States, Canada, Italy, United Kingdom and West Germany (McManus et al., 1997). The study also showed that antibiotic sales grew from 2% in the United States to 5% in West Germany from 1989 to 1994 (McManus et al., 1997).

A study done in 1978 in the United States demonstrated a sharp increase in antibiotic use within the years 1965 to 1973 with a decline of about 7.5% between 1973 and 1977 (Finkel, 1978). The use of antibiotics in England rose by 10% between 1990 and 1991 (Davey et al., 1996) with

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Scotland having an increase of 12% in 1993 (Davey et al., 1996). The types of antibiotics used were commonly ampicillin and quinolones.

The majority of antibiotics were prescribed and used within the community practice with about 80.4% of antibiotics used in Canada prescribed by a family practitioner (Health et al., 1997). A study by Fries at al. in Denmark showed that the most common ailments for which antibiotics were used included tonsillitis (16%), sinusitis (12%), conjunctivitis (11%), urinary tract infections (11%) and otitis media (8%) (Friss et al.,1987). A similar study in Norway concluded that antibiotics were indicated in the treatment of bronchitis (14%), colds (8%), tonsillitis (8%), sinusitis (7%) and pneumonia (5%) (Davey et al., 1996). A study involving 1005 participants in the United States also concluded that the five commonest ailments antibiotics were medically indicated for were cough, sore throat, fever, nasal congestion and earache (McCaig et al., 1995). In the EU, outpatient antibiotic use has increased slightly in 1997 with a DDD of 0.05 per 1000 inhabitants per day in a quarter (Fabbrietti et al., 2011).

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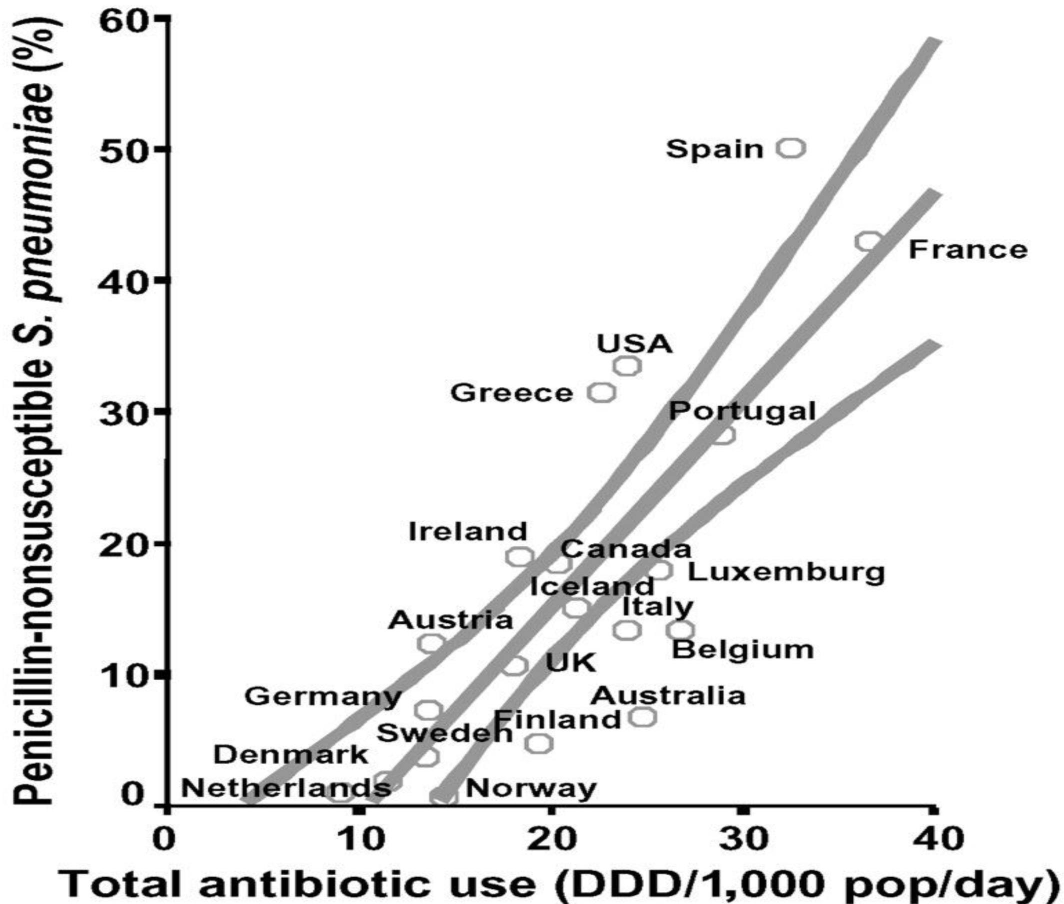

Figure 2.3: Total antibiotic use in daily defined dose (DDD) against penicillin – nonsusceptible Streptococcus pneumonia (Goossens et al, 2005)

Interestingly, China consumes more antibiotics than any other country in the world with the WHO estimating that about 80% of patients admitted to hospitals are administered some form of broad spectrum antibiotics with 58% receiving multiple courses of antibiotics (Mensah et al., 2016) compared to the global consumption of 30%.

A study among Yerevan adult population concluded that about 12.5% of the participants did self-medicate with antibiotics (Martirosyn, 2014). A study in Yemen by Abdulkareem et al concluded that about 51% of prescriptions contained antibiotics (Abdulkareem, 2011). 50.1% of

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prescriptions were found to contain antibiotics in a study conducted in the Osun state of Nigeria (Boadu, 2014).

Antibiotics are commonly used in developing countries as a result of the high rate of infections. This has been worsened as a result of the increase in the number of people living with the human papilloma virus (HIV) (Acheson et al., 2001). In developing countries antibiotics are often misused due to the ease at which they can be obtained and the lack in regulation of antibiotics.

Over the years antibiotic resistant strains have been seen in pneumococcal meningitis, typhoid fever and tuberculosis.

2.3.2 Local use

A study by Donkor et al showed that 30% of tertiary students in Accra consume antibiotics within a month with about 70% of the participants taking antibiotics without prescription (Mensah et al., 2016); similar to a study in community pharmacies within the Cape Coast Metropolis (Tagoe et al., 2010). Most of the studies found amoxicillin to be the most commonly used antibiotic without prescription with cold and cough accounting for the ailments for which people used antibiotics (Mensah et al., 2016). A study in eleven community pharmacies in the Cape Coast Metropolis concluded that about 71.5% of antibiotics were purchased by participants without prescription. The same study found that more males (59.2%) consume antibiotics compared to females (40.8%).

A hospital study in the Wassa district concluded that about 60.7% of the hospital records of 700 outpatients contained antibiotics (Bosu et al., 2010). Another study conducted in public health dispensaries and facilities also concluded that 43.3% of prescriptions contain antibiotics (Arhinful et al., 2009).

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2.4 Factors influencing consumption of antibiotics within the community setting

Antibiotic-Resistant Strains (ARS) are commonly found within the hospital setting. Recently however, due to the high use of antibiotics within the community, ARS is increasingly on the rise within the community setting (Levy, 2002). Factors accounting for the rise in antibiotic consumption within the community setting apart from medically indicated use include but not limited to over- prescription of antibiotics by physicians, self-medication, sharing of stored antibiotics, sale of antibiotics as a ‗commodity' in most developing countries, inability to access effective and affordable healthcare, imbedded attitudes and beliefs that antibiotics can cure every form of ailment, lack of knowledge on safe and proper use of antibiotics and literacy level (Okeke, 2005; Hardon et al., 2004). The assumption whether real or not that patients expect the prescriber to include antibiotics in their prescriptions cannot be ruled out. Characteristics of the individual user as well as demographics also determine whether an individual will consume antibiotics or not (Green et al., 1980). Antibiotics are ideally prescribed after a diagnostic test of bacterial infection; but this is not the case in practice. It has also been hypothesized that wrong estimates is a key factor in the unnecessary use of antibiotics (Buetow et al., 1997). For the purposes of this work, the factors that would be studied include socioeconomic factors, knowledge, attitudes/practices and access to healthcare.

2.5 Conceptual Framework

The conceptual framework that guides the study involves both dependent and independent variables as shown in figure 2.4

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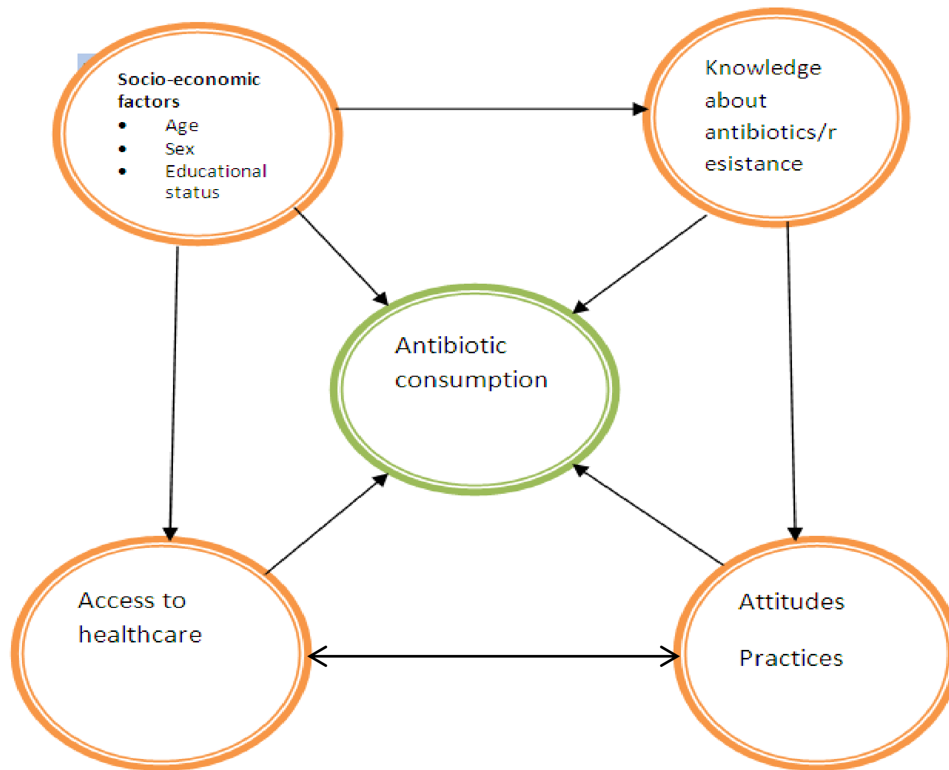

Figure 2.4: Conceptual framework guiding the study

The independent variables include knowledge, access to healthcare, attitudes and practices towards antibiotic consumption which is the dependent variable. Aiken (2002) opined that, practices that individuals engage in are a manifestation of first their knowledge and attitudes towards a phenomenon. The conceptual framework depicts that an individual's socio-economic factors (Age, Sex and educational status, occupation) is linked closely with the level of knowledge which in turn influences their attitudes and practices towards antibiotic consumption. The socio-economic factors would also impact on the individual's ability to access healthcare. Relevant literature relating to these has been presented below.

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2.6.1. Demographic/socioeconomic factors

Demographic and socio-economic factors such as sex, age, area of residence, educational level and income affect the use of antibiotics in the community (Radyowijati, 2002). Based on socioeconomic factors, people avoid the cost of visiting the doctor and resort to purchasing antibiotics for symptoms such as headache and cold (Widayati, 2011).

From literature, the relationship/association between educational levels and antibiotic use is inconsistent (Widayati, 2011).

2.6.2. Knowledge of antibiotic and antibiotic resistance

Many studies have been performed with regards to the knowledge of the general public on the use/misuse of antibiotics and found that there is little or no understanding (Palmer et al., 1997; Mainous et al., 1997; Wilson et al., 1999). The knowledge individuals have on antibiotic use/misuse is actually related to and can affect other factors such as atitudes, behaviours and compliance (Mainous et al, 1997). In many developing countries, antibiotics are perceived to be ‗miracle drugs' that can cure almost all forms of ailment and as such are taken for treatment and prevention of common ailments such as cold, diarhoea, fever and headache (Abellanosa, 1996). Many individuals cannot distinguish between antibiotics and other medications (Norris P, 2007).

Many people use antibiotics in the treatment of viral infections where they are not medically indicated. The general knowledge of individuals with respect to the use of antibiotics in most commonly occurring infections within the community have been shown to be low in most studies (Murray, 1991). In a study by Palmer and Bauchners, many of the participants said antibiotics could be used to treat ear infections (93%), throat infections (83%), cough (58%), fever (58%) and cough (32%) (Levy, 2002). In another study, 55% of the participants said antibiotics were indicated in viral infections with 21% correctly responding that antibiotics were indicated in

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bacterial infections and not viral infections (Goossens, 2009). A cross sectional study of self-medication among tertiary students in Accra showed that 49% of the participants had poor knowledge about the consequences of antibiotic misuse/abuse (Donkor et al., 2012).

2.6.3. Attitudes/Practices towards antibiotic consumption

Many studies have found that attitudes and behavior affect the way individuals perceive and consume antibiotics (Conner et al., 2005; Rimer et al., 2005).

A study in Cyprus found that many patients would expect their physician to prescribe antibiotics in the management of earache(51%), fever (41%) or sore throat (27%) with 6% of the study participants admitting that they would purchase antibiotics over the counter if their physician had previously prescribed it for them (Rouusounides et al, 2011).

2.6.4. Access to healthcare

Antibiotics are generally available in developing countries; however the use of antibiotics is often restricted to those who can afford them. In most hospital settings in developing countries firstline antibiotics such as ampicillin, cloxacillin, gentamicin, penicillin etc are used due to their affordability (Eneaji, 2017). This has led to the development of bacteria resistant strains in conditions which hitherto could be treated with these antibiotics. The cost of providing antibiotics is as low as 0.13 pence per patient in most developing countries (Vuylsteke, 2004). This comparatively low sum cannot be afforded by most developing countries. Access to quality antibiotics still remains a huge problem in most developing countries.

Most laboratories in developing countries are not fully equipped to carry out sensitivity testing before antibiotics are administered (Ochiai et al, 2008). Where these laboratories are available,

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they tend to be too expensive for the average patient to afford. This has led to the culture where most physicians prescribe antibiotics without sensitivity testing leading to the increase in the development of antimicrobial resistance (Ochiai et al, 2008).

Studies in the community with regards to antibiotics have shown that individuals tend to alternate providers to obtain their antibiotics in order to save time, save cost and have the freedom to purchase these drugs whenever needed (Hardon, 1987). A study by Okeke in 2005 discovered that about 72% of Nigerians used antibiotics when it came to treatment of diarhoea with about 80% purchasing antibiotics without prescription even though they had free medical care (Okeke, 2005).Financial constraints, long queues/waiting hours also contribute to self-medication with antibiotics among community users (Corbett et al., 2005; Larson et al., 2006).

2.7 Gaps in the literature

This section presents a summary of the gaps in literature concerning the issues under study. To begin with, there is limited literature on the prevalence of antibiotic consumption in Ghana. Most of these studies only looked at the effect of socio-demographic factors that influence an individual to consume antibiotics. Almost all the studies reviewed used purposive sampling which is a non-probability sampling approach with a high level of bias if used in quantitative studies. No literature on studies performed in Ghana used the household survey method. None of the studies on the Ghanaian context have focused on factors influencing antibiotic consumption as well as the effect of knowledge, attitudes and practices of the individual towards antibiotic consumption.

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CHAPTER THREE

METHODOLOGY

3.1 Study design

To achieve the general and specific objectives of this research study, a cross-sectional community-based household survey using interviewer-administered questionnaire was undertaken in the Greater Accra Metropolis.

3.2 Study location

The Greater Accra Metropolis is bordered to the north by the Ga West Municipal district, to the west by the Ga South Municipal district, to the east by La Dadekotopon Municipal district, and to the south by the Gulf of Guinea. The metropolis is sub-divided into eleven (11) districts with a total population of about 1,665,086 representing 42 percent of the region's total population and a household population of 1,599,914 with a total number of 450,748 households. The average household size is 3.7 persons per household (PHC, 2010). The total population of adults aged 15 years and above is 1,316,895 (PHC, 2010).

There are 72 communities and 76 electoral areas. The districts include Ablekuma Central, Ablekuma North, Ablekuma South, Ashiedu Keteke, La, Ayawaso Central, Ayawaso East, Ayawaso West, Okaikoi North, Okaikoi South, and Osu Klottey.

The populations of both sexes aged 15 years and above in the five districts are: 397,409 (Ablekuma South, North and Central), 214,501 (Ashiedu Keteke & La), 90,926 (Osu Klotey), 290,845 (Ayawaso West, East & Central) and 246, 815 (Okaikoi South and North) (PHC, 2010).

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Half of the population eleven years and above (52%) is literate in both English and Ghanaian language, with 40% literate in English language alone. English and Ghanaian languages are the main means of communication (PHC, 2010). More than a third of both sexes are engaged in sales and services work (PHC, 2010)

3.3 Source and Study Population

The source population included all individuals resident in the Greater Accra Metropolis during the study period. The study population however included all individuals aged 18 years and above resident in Ablekuma (Central, North and South), Ayawaso (Central, East and West), Osu Klottey, La, Ashiedu Keteku and Okaikoi (North and South).

3.4.1 Inclusion criteria

- All Ghanaian individuals aged 18 years and above residing within the Greater Accra Metropolis during the study period.

3.4.2 Exclusion criteria

- Foreigners and visitor‘s residing within the selected sub-metros did not form part of the study.
- Individuals aged less than 18 years.
- All health facilities, pharmacies and licensed chemical shops.

3.5 Study variables

This section presents the variables, their definitions and scale of measurement in the study.

3.5.1 Dependent variable

- Antibiotic use/consumption.

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3.5.2 Independent variables

The independent variables are:

- Socio-demographic characteristics – such as age, sex, educational status and employment.
- Knowledge of antibiotics – participant�seseds understanding of what antibiotics are, uses of antibiotics and what antibiotic resistance is.
- Attitudes towards consumption of antibiotics – participants‘ inert feelings and perceptions towards consumption of antibiotics measured on the Likert scale.
- Practices relating to consumption of antibiotics - manner in which participants‘ act towards consumption of antibiotics based on their knowledge and attitudes measured on the Likert scale.
- Access to healthcare – holder of insurance (private or public).

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The table below provides the variables to be studied with their associated definitions and scales of measurement.

Table 3.1: Study variables

Variable to be studied	Definition	Scale of measurement
Age	Grouped as 18-24, 25-34, 45-54, 55-64, over 65	Categorical 18-24 = 1, 25-34 = 2 45-54 = 3, 55-64 = 4 Over 65 = 5
Gender	Defined as male or female	Dichotomous 1=male 2= female
Education	None (No formal education at all) Basic (Completed JHS based on current GES system) Medium (completed Senior Secondary School based on current GES system) Graduate (Completed any tertiary institution, or holds or studying masters/PHD)	Ordinal None = 1 Basic = 2 Medium = 3 Graduate = 4
Employment	Unemployed (Not working at all) Skilled worker (any formal job) Manual worker (non-formal jobs)	Nominal Unemployed = 1 Skilled worker = 2 Manual worker = 3

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Holder of insurance	Yes (subscribes to national or private insurance) No (Does not subscribe to national or private insurance or insurance has expired)	Categorical Yes = 1 No = 2
Antibiotic use/consumption (Dependent variable)	Yes (used antibiotics within the last six months) No (not used antibiotics before)	Categorical Yes =1 No = 2
Type(s) of antibiotic used	Commonly used antibiotics arranged in alphabetical order	Categorical Augmentin/Amoksiklav = 1 Ampicillin = 2 Cloxacillin =3 etc
How antibiotic was obtained	Prescription (prescribed by a qualified physician) OTC Left overs (antibiotics from previous prescription or OTC) Both (prescription and OTC)	Categorical Prescription = 1 OTC = 2 Left overs = 3 Both = 4
Condition(s) antibiotic was taken for (Reason for using antibiotics)	Headache Cold, Cough, Sorethroat Fever Toothache Stomach pain itching Others	Categorical Headache =1 Cold, Cough, Sorethroat = 2 Fever = 3 Toothache = 4 Stomach pain = 5 Itching = 6 Others = 7
Place antibiotic was obtained	Hospital	Categorical

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	Community pharmacy Licensed chemical shop Peddlers Others (internet etc)	Hospital = 1 Community pharmacy = 2 Licensed chemical shop = 3 Peddlers = 4 Others = 5
Knowledge score (regarding antibiotic use)	Right answers coded as 1 Wrong or do not know coded as 0	Ordinal Right – 1 Wrong = 0 Do not know = 0
Knowledge score (regarding antibiotic resistance)	Right answers coded as 1 Wrong or do not know coded as 0	Dichotomous Right – 1 Wrong = 0
Attitude score	Based on the Likert scale Strongly agree, Slightly Agree, Neither agree nor disagree, Slightly disagree, Strongly disagree	Ordinal Strongly agree = 1 Slightly Agree – 2 Neither agree nor disagree = 3 Slightly disagree = 4 Strongly disagree = 5

3.6 Sample and Sampling Procedure

The survey was conducted in the Greater Accra Metropolis from June 5, 2018 to June 10, 2018. The eleven districts within the Greater Accra Metropolis were stratified into five clusters as follows; Ablekuma (consisting of Ablekuma South, Ablekuma North and Ablekuma Central), Ayawaso (Consisting of Ayawaso West, Ayawaso East and Ayawaso Central), Okaikoi

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(consisting of Okaikoi North and Okaikoi South), Ga South (consisting of Ashiedu Keteke and La) and Osu Klottey. The known communities within these selected districts were listed independently and randomize using ‗randbetween' an excel tool to obtain the communities to work in. Four communities were selected from each of the five clusters giving a total of twenty communities. The sample size was distributed proportionately among the twenty communities.

At the community, a street was identified and the ‗days-code' was used to determine which household to visit first. In each household, all individuals aged 18 years and above who consented to take part in the study were administered questionnaires by the research assistant after explaining the background and intentions of the study.

Systematic sampling using a one in three gap was used to identify the next household to be included in the study until the sample size of 470 was achieved.

3.7. Sample Size

The sample size used in the study was four-hundred and seventy (470) which was computed using the Cochran formula (Cochran, 1968) with a sampling error of 5%, confidence interval of 95% and a prevalence of antibiotic use in developing countries of 50% (Boadu, 2014).

The sample size was computed as follows:

$$n = \frac{z^2pq}{d^2}$$

Where:

$z = 1.96$

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P = Proportion of the population estimated to consume antibiotics in developing countries (p) = 50% = 0.5

d = confidence level (0.5) 95%

q = 1-P thus 1- 0.5 = 0.5

$$n = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2} = 384$$

Non response margin: from literature, the non-response rate for household surveys could be as high as 35%; adjusting for non-response rate of 22%;

$$\text{Sample Size} = 384 * \frac{22}{100} = 84.48$$

Thus: 384 +84.48 = 468.48 individuals which was approximated to 470 participants.

The samples were proportionately divided between the five clusters as follows:

Table 3.2: Proportionate size of samples in clusters

District	Proportional sample
Ablekuma (South, Central & North)	112
Ayawaso (East, West & Central)	102
Osu Klotey	72
Okaikoi (South & North)	97
Ashiedu Keteku (Ga south)	87
Total	470

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3.8 Data collection tool/ Procedure

To achieve the general and specific objectives of the study, an interviewer-administered structured questionnaire consisting of five sections was used to collect information on the participants. The design of the questionnaire was based on previous studies (Pechere et al., 2007; Curry et al., 2006). It consisted of the sections to assess the prevalence of antibiotic use (six questions), socio-demographic information (six questions), knowledge about antibiotics (five questions), knowledge about antibiotic resistance (four questions) and attitude/practice towards antibiotic use (seven questions on the Likert scale).

The socio-demographic section was designed to obtain some characteristics of the participants that may influence antibiotic use.

The antibiotic use section was designed to obtain information on the prevalence of antibiotic use, the types of antibiotics commonly used and where they are obtained, the conditions the antibiotics were used to treat and the place and mode of purchase of the antibiotics.

The knowledge sections were designed to evaluate the basic knowledge of participants with regards to the duration antibiotics should be taken, types of diseases antibiotics can be used to treat, side effects of antibiotics, whether left-over antibiotics can be taken from friends/family, familiarity with the term antibiotic resistance, who antibiotic resistance affect and whether antibiotic resistance is a problem in Ghana.

The attitude towards antibiotic use section was designed to determine the attitudes/practices of participants towards purchase of antibiotics, when antibiotics can be taken, sharing of antibiotics, coercing doctors to prescribe antibiotics, completing antibiotics as scheduled, side-effects of antibiotics and repeated use of antibiotics in treatment of similar illness. The responses were

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based on a five point Likert type scale which ranged from strongly agrees, slightly agree, neither agree nor disagree, slightly disagree and strongly disagree.

The questionnaire was designed in English but administered to the participants in a language acceptable to both the interviewer and the participants. Almost all the interviews were administered in English, Twi or Ga. Samples of commonly consumed antibiotics were shown to participants who had no education background. In some instances, participants with no educational background described the antibiotics consumed or gave the local names of these antibiotics.

The questionnaires were administered by trained research assistants who had previous experience in data collection and understood the methodology used in this study; notwithstanding the principal investigator went through the modalities to administer the questionnaire as well as the appropriate translations from English to Ghanaian language where applicable to ensure uniformity.

The questionnaire was pre-tested on 20 participants to ensure appropriateness and comprehensiveness in achieving the general and specific objectives of the study. There were no modifications on the questionnaire after pre-testing since it was found to be appropriate and comprehensive to achieve the stated objectives and answer the research questions in the study. Averagely, ten minutes was required to complete each questionnaire per participant. The data were then entered into excel spreadsheet and various parameters analyzed using stata version 15.0.

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3.9. Data processing/Management

Data collected were checked for completeness and/or inconsistencies and entered into excel spreadsheet 2013 using double-entry method. The data were then imported into Stata version 15.0 for cleaning, validation and analysis.

3.10. Statistical Analysis

After the data were imported into Stata version 15.0, cleaned and validated, it was analyzed for various parameters. Descriptive analysis was performed on the characteristics of the participants using the information under the socio-demographic section. Frequencies and proportions were computed for the characteristics of respondents and the outcome variables. Completed age in years was calculated by subtracting the respondents' years of birth from 2018, the year the data was collected. The completed age in years was also categorized into the intervals 18-24 years, 25-33 years, 34-40 years and above 40 years. Mean and standard deviation was calculated for the age in years.

Frequencies and proportions were computed for statements and questions on antibiotic knowledge and attitudes towards antibiotics. Each right answer under the knowledge questions was scored one (1) and each wrong answer scored zero (0). There were 13 questions in total. The total score for each respondent was then converted to 100 to determine their overall knowledge. After which the mean, standard deviation, median score, lower and upper quartiles were computed for. The percentage scores were categorized into two. Participants with scores below 50% were deemed as having low level knowledge of antibiotics and participants with scores of 50% and above were deemed to have high level knowledge of antibiotics.

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Similar case was done for attitudes of respondents towards antibiotics. The questions of attitudes on knowledge towards antibiotics were on a 5 point Likert type scale (1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree) and there were a total of seven (7) items. The highest total possible score for all 7 items was 35 after all positive items was reversed to negative items. The score for each respondent was converted to 100 to determine their overall attitude score. The higher the participant‘s score on attitudes, the poorer their attitudes towards antibiotic use. The percentage scores were categorized into two; participants who scored below 50% were deemed to have good attitudes towards antibiotic use and those who scored 50% and above were deemed to have poor attitudes towards antibiotics.

The chi-square test of association was used to determine association between the demographics and the outcome variables (thus antibiotic use, knowledge on antibiotics, knowledge on antibiotic resistance and attitudes towards antibiotics).

The binary logistic regression model was used to determine antibiotic use/consumption. Results were expressed as Odds Ratio (OR) with 95% Confidence Interval (CI) with a two-tailed p value ≤ 0.05 considered statistically significant in all the analyses.

3.11 Confidentiality, Ethical Consideration and Data security

Participation in the study was voluntary without any compensation. Written informed consent was obtained from each participant after the background and motives of the study were explained to them.

Anonymity of participants was assured by assigning ID numbers to the participants instead of using their names. Data obtained from the study is maintained under the strict confidentiality and

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accessible to only the institution and the principal researcher and used for publications related to this study only. The data would be destroyed after five years.

Ethical approval was obtained from the Ghana Health Service Ethics Review Committee (GHS-ERC Number: GHS-ERC:077/02/18) and written consent obtained from the Accra Metropolitan Assembly (AMA).

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CHAPTER FOUR

RESULTS

4.1. Descriptive statistics of sample

A total of 470 respondents were recruited into the study. Majority of the respondents were males (n = 247, 52.6%) and the remaining females (n = 223, 47.5%). The mean age of respondents was 35.7 ± 11.2 years. Most of the respondents were between the ages of 25 to 33 years (n = 162, 34.5%) and a few of them were between the ages of 18 to 24 years (n = 65, 13.8%). About 26% (n=216) of the respondents had tertiary as their highest level of education. A few of the respondents (n = 16, 3.4%) had no formal education. More than half (56.2%) of the respondents were skilled workers, 19.4% were manual workers and 24.5% of the respondents were unemployed. Most of the respondents had health insurance (n = 362, 77%). Majority (93.4%, n = 439) of the respondents had used antibiotics before and the remaining 6.4% (n=31) had never used antibiotics before. The characteristics of the respondents are presented in table 4.1 below.

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Table 4.1: Descriptive characteristics of the respondents

Characteristics of respondents	Frequency (N= 470)	Proportion (100%)
Sex of respondent		
Male	247	52.55
Female	223	47.45
Age in years(mean ± SD)	(35.65 ± 11.23)	
18-24 years	65	13.83
25-33 years	162	34.47
34-40 years	121	25.74
Above 40 years	122	25.96
Highest level of education		
None	16	3.40
Basic	81	17.23
Medium	157	33.40
Tertiary	216	45.96
Employment status		
Skilled worker	264	56.17
Unemployed	115	24.47
Manual worker	91	19.36
Area of residence		
Ablekuma	112	23.83
Osu clottey	72	15.32
Ga south	87	18.51
Okaikoi	97	20.64
Ayawaso	102	21.70
Insurance status		
Yes	362	77.02

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No	108	22.98
Use of antibiotics		
Yes	439	93.40
No	31	6.60

SD: standard deviation

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4.2 Level of antibiotic use

Of the total 439 respondents who had ever used antibiotics, 49 (11.2%) were currently using antibiotics, 87 (19.8%) had used antibiotics less than a month ago and 128 (29.2%) had used antibiotics more than a year ago. The most common antibiotics used were Augmentin/ Amoksiklav (n = 115, 26.2%), followed by Cloxacillin (n = 109, 24.8%). About 8.9% of the respondents used other antibiotic such as Flucloxacillin, Zithromax, etc. A high percentage (71.1%, n = 312) of the antibiotic users purchased antibiotics by prescription. About 28.9% (n = 127) of the antibiotic users purchased the antibiotics without prescription. Most respondents obtained those antibiotics from the hospitals (n = 207, 47.2%), 25.7% (n = 113) of them purchased their antibiotics from a community pharmacy. Very few of the participants got their antibiotics from street peddlers (n = 20, 4.6%), at home (n = 9, 2.1%) and from friends/relatives (n = 5, 1.1%). About 27.3% (n = 120) of the antibiotic users used antibiotics for pain relief, 16.2% (n = 71) used antibiotics for toothaches and 14.1% of them used antibiotics for treatment of sore throat. Table 4.2 below shows detailed description on the level of antibiotic usage by respondents.

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Table 4.2: Level of antibiotic usage among users of antibiotics

Level of antibiotic usage	Frequency (N= 439)	Proportion (100%)
Last time used		
Currently using	49	11.16
< 1 month	87	19.82
1-6 months	90	20.50
6-12 months	85	19.36
>12 months	128	29.16
Most used antibiotics		
Penicillin	92	20.96
Augmentin/Amoksiklav	115	26.20
Ampicillin	84	19.13
Cloxacillin	109	24.83
Others (Flucloxacillin, Zithromax, etc.)	39	8.88
Purchase by prescription		
Yes	312	71.07
No	127	28.93
Place of purchase		
At the hospital	207	47.15
Community pharmacy	113	25.74
License chemical shop	85	19.36
Street peddlers	20	4.56
Had at home	9	2.05
Friends/ relatives	5	1.14
Treatment condition		
Headache	6	1.37
Cold	24	5.47

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Cough	31	7.06
Sore throat	62	14.12
Fever	61	13.90
Toothache	71	16.17
Pain	120	27.33
Itching	18	4.10
Others (chicken pox, rashes, etc.)	46	10.48

4.3 Association between socio-demographic characteristics of respondents and the use of antibiotics

Majority (92.3%, n = 228) of the 247 male respondents had used antibiotics before and 94.6% (n = 211) of the 223 female respondents had used antibiotics before. Most (81.5%) of the respondents aged between 18 and 24 years had used antibiotics before and about 95% of the respondents in each of the age categories 25-33 years , 34-40 years and above 40 years had used antibiotics before. The use of antibiotics was significantly associated with the age categories ($\chi^2 = 17.339, p = 0.001$). Highest level of education ($\chi^2 = 32.3125 , p < 0.001$)and the employment status ($\chi^2 = 17.9588, p < 0.001$) of the respondents were also both significantly associated with the use of antibiotics. Area of residence ($\chi^2 = 12.5591 , p = 0.014$) and the insurance status ($\chi^2 = 4.6405, p < 0.031$) of respondents also showed significant association with the use of antibiotics. Refer to table 4.3 for further test of association between antibiotic usage and the socio-demographic factors.

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Table 4.3: Association between the characteristic of respondents and the use of antibiotics

		Usage of antibiotics			
Characteristics of respondents	**Total**	**Yes n (%)**	**No n (%)**	χ^2	***p* -value**
Sex of respondent				1.0161	0.313
Male	247	228 (92.31)	19 (7.69)		
Female	223	211 (94.62)	12 (5.38)		
Age in years				17.339	0.001**
18-24 years	65	53 (81.54)	12 (18.46)		
25-33 years	162	154 (95.06)	8 (4.94)		
34-40 years	121	115 (95.04)	6 (4.96)		
Above 40 years	122	117 (95.90)	5 (4.10)		
Highest level of education				32.3125	<0.001***
None	16	15 (93.75)	1 (6.25)		
Basic	81	65 (80.25)	16 (19.75)		
Medium	157	146 (92.99)	11 (7.01)		
Tertiary	216	213 (98.61)	3 (1.39)		
Employment status				17.9588	<0.001***
Skilled worker	264	256 (96.97)	8 (3.03)		
Unemployed	115	98 (85.22)	17 (14.78)		
Manual worker	91	85 (93.41)	6 (6.59)		
Area of residence				12.5591	0.014*
Ablekuma	112	111 (99.11)	1 (0.89)		
Osu clottey	72	65 (90.28)	7 (9.72)		
Ga south	87	76 (87.36)	11 (12.64)		
Okaikoi	97	92 (94.85)	5 (5.15)		
Ayawaso	102	95 (93.14)	7 (6.86)		
Insurance status				4.6405	0.031*

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Yes	362	343 (94.75)	19 (5.25)
No	108	96 (88.89)	12 (11.11)

n: cell frequency. %: row percentage. χ^2: Pearson's chi-square value. *: p-value <0.05. **: p-value <0.01. ***: p-value <0.001.

4.4 Determinants of antibiotic usage

The logistic regression model below was used to identify the determinants of antibiotic usage. From the table, the odds of a female using antibiotic were 1.47 times the odds of a male using antibiotic when no adjustment was accounted for (UOR 1.47, 95% CI: 0.7–3.1). When age, education, employment status, area of residence, insurance status, knowledge level and attitudes of a person towards antibiotics were adjusted for, the odds of a female using antibiotics was 1.53 times the odds of a male using antibiotics (AOR: 1.53, 95% CI: 0.6–3.7). The odds of an individual with tertiary level of education using antibiotics was 4.7 times the odds of an individual with no formal education when no adjustment was accounted for (UOR 4.7, 95% CI: 0.5–48.3). In all, the educational level of individual was a significant determinant of use of antibiotics when no adjustment was accounted for ($p < 0.001$). After controlling for sex, age, employment status, area of residence, insurance status, knowledge level and attitude of an individual towards antibiotics, the odds of an individual with tertiary level of education using antibiotics was 8.35 times the odds of an individual with no formal education (95% CI: 0.54 - 128.72). Level of education was also a significant determinant of antibiotic use when adjustments were made ($p<0.001$). From the adjusted logistic model in table 4.4 below, highest level of education and area of residence were significant determinants of the use of antibiotics ($p<0.05$). More information is shown in table 4.4.

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Table 4.4: Effect of socio-demographic characteristics of respondents on the use of antibiotics

	Unadjusted effect			Adjusted effect		
	UOR	**95% CI**	***p* -value**	**AOR**	**95% CI**	***p* -value**
Sex of respondent			**0.311**			**0.339**
Male	1			1		
Female	1.47	(0.69-3.09)	0.316	1.53	(0.64- 3.65)	0.339
Age in years			**0.005****			**0.2806**
18-24 years	1			1		
25-33 years	4.36	(1.69-11.24)	0.002**	2.66	(0.85- 8.28)	0.092
34-40 years	4.34	(1.55-12.19)	0.005**	1.92	(0.51- 7.21)	0.333
Above 40 years	5.30	(1.78-15.8)	0.003**	2.93	(0.8- 10.73)	0.104
Highest level of education			**<0.001*****			**<0.001*****
None	1			1		
Basic	0.27	(0.03- 2.2)	0.222	0.36	(0.04 -3.56)	0.384
Medium	0.88	(0.11-7.33)	0.91	1.64	(0.15- 17.59)	0.684
Tertiary	4.73	(0.46-48.31)	0.19	8.35	(0.54-128.72)	0.128
Employment status			**<0.001*****			**0.873**
Unemployed	1			1		
Skilled worker	5.55	(2.32-13.28)	<0.001***	1.90	(0.62- 5.85)	0.265
Manual worker	2.46	(0.93-6.52)	0.071	3.48	(1.11- 10.87)	0.032*

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Area of residence			**0.005****			**<0.001*****
Ablekuma	1			1		
Osu clottey	0.08	(0.01- 0.7)	0.022*	0.07	(0.01- 0.65)	0.019*
Ga south	0.06	(0.01- 0.49)	0.008**	0.06	(0.01- 0.48)	0.009**
Okaikoi	0.17	(0.02- 1.44)	0.104	0.29	(0.03- 2.74)	0.282
Ayawaso	0.12	(0.01- 1.01)	0.051	0.24	(0.03- 2.21)	0.207
Insurance status			**0.0418**			**0.851**
Yes	1			1		
No	0.44	(0.21- 0.95)	0.035*	0.91	(0.34- 2.41)	0.851
Knowledge level			**0.1033**			**0.849**
Low	1			1		
High	2.33	(0.9- 6.01)	0.08	0.89	(0.26- 3.02)	0.849
Attitude towards antibiotics			**0.03***			**0.939**
Poor	1			1		
Good	3.65	(1.28- 10.4)	0.016*	0.95	(0.24- 3.81)	0.939

UOR: Unadjusted odds ratio. AOR: Adjusted odds ratio. *: p-value <0.05. **: p-value <0.01. ***: p-value <0.001. overall significant of a variable are in bold fonts.

4.5 Knowledge of respondents on antibiotics

Of the 470 respondents interviewed, 68.1% (n = 320) knew how long antibiotics could be taken, 81.3% (n = 382) of them knew that antibiotics could be used to treat bacteria infections, and 95.1% (n = 447) of the respondents answered correctly to whether antibiotics could be used to treat headache. The overall mean score of knowledge in percentage was 69.1% ± 13.9%. A tenth

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of the respondents had low knowledge on antibiotics and 90% of the respondents had high knowledge on antibiotics. Refer to table 4.5 for further information on knowledge of respondents on antibiotics.

Table 4.5: Knowledge of the respondents of antibiotics and antibiotic resistance

Question/ statement of about antibiotics	Right answer n (%)	95% CI
How long should I take antibiotics for?	320 (68.09)	(63.86- 72.31)
Antibiotics can be used to treat bacterial infections.	382 (81.28)	(77.74- 84.82)
Antibiotics can be used to treat viral infections.	197 (41.91)	(37.44- 46.39)
Antibiotics can be used to treat Headache.	447 (95.11)	(93.15- 97.06)
Antibiotics can be used to treat fever.	354 (75.32)	(71.41- 79.23)
Antibiotics can be used to treat malaria.	292 (62.13)	(57.73- 66.53)
Antibiotics can be used to treat diarrhoea.	334 (71.06)	(66.95- 75.18)
I can take antibiotics from my friends when I have similar illness	369 (78.51)	(74.78- 82.24)
Do antibiotics have side effects?	400 (85.11)	(81.88- 88.34)
Have you heard of antibiotics resistance before?	329 (70.00)	(65.84- 74.16)
Antibiotics resistance can occur when I don‘t use antibiotics the right way.	367 (78.09)	(74.33- 81.84)
Antibiotic resistance does not affect me, my family or friends.	340 (72.34)	(68.28- 76.40)
Antibiotics resistance is not a problem in Ghana.	93 (19.79)	(16.17- 23.40)
Overall score on knowledge		
Mean score of knowledge in percentage (mean ± SD)	69.13 ± 13.93	
Median score of knowledge in percentage (median, (LQ – UQ))	69.23 (61.54 – 76.92)	
Knowledge rating		
Low level of knowledge (n (%))	47 (10.00)	
High level of knowledge (n (%))	423 (90.00)	

n: cell frequency. %: cell percentage. SD: standard deviation. LQ: Lower quartile. UQ: Upper quartile. CI: confidence interval.

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4.6 Association between socio-demographic characteristics of respondents and their knowledge level

Of the 247 male respondents, 223 (90.3%) of them had high level of knowledge on antibiotics and of the 223 female respondents, 200 (89.7%) of them had high level of knowledge on antibiotic usage. 87.7% (n = 57) of the respondents in the age range 18 to 24 years had high level of knowledge on antibiotics, 91.4% (n = 148) of the 162 respondents in the age range 25 to 33 years also had high level of knowledge on antibiotics. Level of knowledge was significantly associated with highest level of education ($\chi^2 = 62.9581, p < 0.001$), employment status ($\chi^2 = 15.3092, p < 0.001$), area of residence ($\chi^2 = 35.1821, p < 0.001$) and insurance status ($\chi^2 = 23.274, p < 0.001$). Table 4.6 shows further information on the Pearson's chi-square test of association between the socio-demographic factors and level of knowledge of the respondents.

Table 4.6: Association between socio-demographic characteristics and knowledge level

Characteristics of respondents	Total	Knowledge level Low n (%)	High n (%)	χ^2	*p*-value
Sex of respondent				0.0465	0.829
Male	247	24 (9.72)	223 (90.28)		
Female	223	23 (10.31)	200 (89.69)		
Age in years				1.8356	0.607
18-24 years	65	8 (12.31)	57 (87.69)		
25-33 years	162	14 (8.64)	148 (91.36)		
34-40 years	121	10 (8.26)	111 (91.74)		
Above 40 years	122	15 (12.3)	107 (87.7)		
Highest level of education				62.9581	<0.001***

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None	16	7 (43.75)	9 (56.25)		
Basic	81	21 (25.93)	60 (74.07)		
Medium	157	17 (10.83)	140 (89.17)		
Tertiary	216	2 (0.93)	214 (99.07)		
Employment status				15.3092	<0.001***
Skilled worker	264	14 (5.3)	250 (94.7)		
Unemployed	115	20 (17.39)	95 (82.61)		
Manual worker	91	13 (14.29)	78 (85.71)		
Area of residence				35.1821	<0.001***
Ablekuma	112	6 (5.36)	106 (94.64)		
Osu clottey	72	3 (4.17)	69 (95.83)		
Ga south	87	5 (5.75)	82 (94.25)		
Okaikoi	97	7 (7.22)	90 (92.78)		
Ayawaso	102	26 (25.49)	76 (74.51)		
Insurance status				23.274	<0.001***
Yes	362	23 (6.35)	339 (93.65)		
No	108	24 (22.22)	84 (77.78)		
Antibiotic usage				3.2272	0.072
Yes	439	41 (87.23)	398 (94.09)		
No	31	6 (12.77)	25 (5.91)		

n: cell frequency. %: row percentage. χ^2: Pearson's chi-square value. *: p-value <0.05. **: p-value <0.01. ***: p-value <0.001.

4.7 Attitudes towards antibiotic usage

The overall mean score of the attitudes of respondents toward antibiotic usage was 81.47% ± 16.9%. Half of the respondents scored between 68.6% and 94.3%. Most of the respondents had good attitudes towards antibiotics (n = 443, 94.3%) and a few of them had poor attitudes toward

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antibiotic usage (n = 27, 5.7%). Detail information on attitudes of respondents towards antibiotic usage is in table 4.7.

Table 4.7: Attitudes of respondents towards Antibiotics

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Attitudes of respondents	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
It is okay to buy antibiotics without prescription	33 (7.04)	101 (21.54)	54 (11.51)	31 (6.61)	250 (53.3)
Antibiotics can be taken anytime I feel sick	24 (5.11)	84 (17.87)	65 (13.83)	39 (8.3)	258 (54.89)
I can give my left over antibiotics to friends and family complaining of similar illness	25 (5.32)	48 (10.21)	38 (8.09)	28 (5.96)	331 (70.43)
It is okay to ask a doctor to give me antibiotics when am ill	42 (8.94)	33 (7.02)	64 (13.62)	47 (10)	284 (60.43)
It is always good to complete your antibiotic course	349 (74.26)	64 (13.62)	33 (7.02)	12 (2.55)	12 (2.55)
Antibiotics do not have any side-effects	30 (6.38)	34 (7.23)	39 (8.3)	31 (6.6)	336 (71.49)
I will use antibiotics anytime am ill because it is safe	38 (8.09)	92 (19.57)	77 (16.38)	35 (7.45)	228 (48.51)
Overall score on attitudes					
Mean score of Attitudes in percentage (mean ± SD)			81.47 ± 16.91		
Median score of attitudes in percentage (median, (LQ – UQ))			85 (68.57 – 94.29)		
Attitudes rating					
Poor attitude (n (%))			27 (5.74)		
Good attitude (n (%))			443 (94.26)		

n: cell frequency. %: cell percentage. SD: standard deviation. LQ: Lower quartile. UQ: Upper quartile

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4.8 Association between socio-demographic characteristics of respondents and their attitudes towards antibiotic use.

Majority (95.1%) of the male respondents had good attitudes towards antibiotics and 93.3% of the female respondents had good attitudes towards antibiotics. About 89.2%, 92%, 96.7% and 97.5% of the respondents with the age ranges 18-24 years, 25-33 years, 34-40 years and 41 years and above respectively had good attitudes towards antibiotics. Age group was significantly associated with attitudes of respondents towards antibiotics ($\chi^2 = 8.3476, p = 0.039$). Attitude of respondent towards antibiotic was significantly associated with highest level of education ($\chi^2 = 37.4113, p < 0.001$) and insurance status ($\chi^2 = 21.3044, p < 0.001$). Detailed information can be read from table 4.8.

Table 4.8: Association between socio-demographic characteristics of respondent and their attitudes towards antibiotics

Characteristics of respondents	Total	Attitudes toward antibiotics Good n (%)	Poor n (%)	χ^2	*p*-value
Sex of respondent				0.7554	0.385
Male	247	235 (95.14)	12 (4.86)		
Female	223	208 (93.27)	15 (6.73)		
Age in years				8.3476	0.039*
18-24 years	65	58 (89.23)	7 (10.77)		
25-33 years	162	149 (91.98)	13 (8.02)		
34-40 years	121	117 (96.69)	4 (3.31)		
Above 40 years	122	119 (97.54)	3 (2.46)		
Highest level of education				37.4113	<0.001***
None	16	15 (93.75)	1 (6.25)		

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Basic	81	65 (80.25)	16 (19.75)		
Medium	157	150 (95.54)	7 (4.46)		
Tertiary	216	213 (98.61)	3 (1.39)		
Employment status				4.3539	0.113
Skilled worker	264	254 (96.21)	10 (3.79)		
Unemployed	115	105 (91.3)	10 (8.7)		
Manual worker	91	84 (92.31)	7 (7.69)		
Area of residence				15.2301	0.004**
Ablekuma	112	111 (99.11)	1 (0.89)		
Osu clottey	72	66 (91.67)	6 (8.33)		
Ga south	87	81 (93.1)	6 (6.9)		
Okaikoi	97	95 (97.94)	2 (2.06)		
Ayawaso	102	90 (88.24)	12 (11.76)		
Insurance status				21.3044	<0.001***
Yes	362	351 (96.96)	11 (3.04)		
No	108	92 (85.19)	16 (14.81)		
Antibiotic usage				6.6097	0.01*
Yes	439	417 (94.13)	22 (81.48)		
No	31	26 (5.87)	5 (18.52)		

n: cell frequency. %: row percentage. χ^2: Pearson‘s chi-square value. *: p-value <0.05. **: p-value <0.01. ***: p-value <0.001.

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CHAPTER FIVE

DISCUSSION

5.1 Types and level of antibiotics consumed

The general objective of this study was to determine the factors influencing the use of antibiotics among adults in the Greater Accra Metropolis.

The study showed that about 93.4% of the respondents had ever used antibiotics with 51.2% having used antibiotics within the past six months. This is consistent with other studies that also found that between 50.1% - 80% of respondents had used antibiotics (Tagoe et al., 2010; Andre et al., 2010). A study in eleven community pharmacies in Cape Coast concluded that 71.5% of participants had used antibiotics (Tagoe et al., 2010) while a study in Canada found that 80.4% of respondents used antibiotics within the community setting (Andre et al., 2010). A multi country survey on antibiotic resistance found that 73% of the respondents had used antibiotics within the past six months (WHO, 2015).

In many parts of the world especially developing countries, sensitivity tests are not performed before antibiotics are administered giving rise to the common dispensing of broad spectrum antibiotics. This study confirmed that the use of broad spectrum antibiotics is common with 26.2% (n=115) of the 439 antibiotic users using Augmentin/Amoksiklav which are all broad spectrum antibiotics composed of Amoxicillin and clavulanic acid. This is in line with other studies that found that the commonly used antibiotic was the broad spectrum antibiotic amoxicillin (Tagoe et al., 2010). In England and Scotland, studies revealed that ampicillin is commonly used (Andre et al., 2010). Another study also found that people in developed

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countries commonly used tetracyclines and amoxicillin compared to ampicillin use in developing countries (Andre et al., 2010).

Following closely to the use of Augmentin/Amoksiklav was cloxacillin (24.8%), penicillin (21%), ampicillin (19.3%) and others accounting for only 8.9% of antibiotics used.

About 71.1% (n=312) of the respondents who had ever used antibiotics in this study obtained their antibiotics with prescription while a moderate 28.9% purchased antibiotics without prescription. This is in line with a WHO multi country survey in Nigeria that found that 75% of the respondents purchased their antibiotics with prescription given to them by a doctor or nurse (WHO, 2015). The finding however contradicts a study in Cape Coast in eleven community pharmacies that found that 71.5% of the respondents purchased antibiotics without prescription (Tagoe et al., 2010).

In the present study, the antibiotics were purchased from hospital (47.2%) and community pharmacy (25.7%) where prescription would be required before antibiotics are dispensed. This was also confirmed with the finding that about 94.8% of the study participants were holders of insurance (public or private) and can therefore afford to visit hospitals and pay for their healthcare contrary to a study that found that 71.9% did not attend hospital when ill (Tagoe et al., 2010).

This study found that majority of the respondents who had ever used antibiotics, used them to treat pain (27.3%) a condition for which antibiotics is not medically indicated. Earlier studies had found that respondents commonly used antibiotics to treat cold or sore throat or any of the commonly occurring upper respiratory infections (Tagoe et al., 2010).

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5.2 Knowledge about antibiotics/antibiotic resistance

About 68.1% of the respondents knew how long antibiotics should be taken. About 81.3% of the respondents said antibiotics could be used to treat bacterial infections. However when asked if antibiotics could be used to treat viral infections, 58.1% of the respondents answered in the affirmative. These conflicting views support the argument that many individuals do not understand the differences between bacteria and viruses and the role antibiotics play in both (Mckee et al., 1999).

About 70% of the respondents were familiar with the term antibiotic resistance but did not think antibiotic resistance affects them, their family or friends (72.3%) or that antibiotic resistance was a problem in Ghana (93%). This goes to emphasize the need to expand education on antibiotic use and antibiotic resistance in order to curb the growing menace of antibiotic resistance. About 85.1% of the respondents knew that antibiotics have side-effects.

The mean knowledge score of the respondents was 69.1% ± 13.9% with a median score of 69.2% (69.5% – 76.9%). Many (90%) of the respondents had high level of knowledge rating. The high knowledge score could be due to the fact that about 79.4% of the respondents had medium to tertiary education.

Over the past two years, the Ministry of Health has intensified its actions on campaigns aimed at curbing antibiotic resistance culminating in the formation of the National Platform on Antimicrobial Resistance (NPAR). The NPAR has carried some sensitization activities to create awareness to both the public and health practitioners on antibiotic use and resistance which could have accounted for the high knowledge of respondents on antibiotic issues.

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In April 2018, the National Action Plan (NAP) on Antimicrobial use and Resistance was launched, less than two months before this survey was carried out. This could have created public awareness which could account for the high knowledge score seen in this research.

5.3 Attitudes/Practices towards antibiotic use

About 53.3% of the respondents strongly disagreed with buying antibiotics without prescription and 60.5% strongly disagreed with coercing doctors to prescribe antibiotics. Most (74.3%) respondents strongly agreed that it is always good to complete a course of antibiotics and 48.5% strongly disagreed with the statement that ‗I will use antibiotics anytime am ill because it is safe'. The mean attitudinal score towards antibiotic use was 81.5% ± 16.9% with 94.3% of the respondents having good attitudinal rating. This is positively correlated with the fact that majority of the respondents had high level of knowledge on antibiotics. This shows that educational campaigns and sensitivity activities being undertaken are positively impacting on the attitudes of individuals towards antibiotic use and should be given all the needed support to continue. These positive attitudes towards antibiotic use however contradict findings in a Kuwait study that found that individuals had negative attitudes towards antibiotic use (Awad et al., 2015).

5.4 Determinants of antibiotic use

Logistic regression analysis was performed to determine the factors that are significantly associated with antibiotic usage.

The results showed that in both the adjusted and unadjusted models, females were more likely to use antibiotics than males. This was however, not statistically significant ($p = 0.339$). The unadjusted odds ratio showed that females had 1.47 (95% CI: 0.69 – 3.09) times the odds of

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using antibiotics than men. Upon adjusting for age, education, employment status, area of residence, insurance status, knowledge level and attitudes, the odds ratio increased to 1.53 (95% CI: 0.64 – 3.65) times. Although this was found not to be statistically significant, the increase in odds ratio shows that there is no confounding. This finding agrees with other studies (Al-Ramahi, 2013). This could be explained by the fact that females are commonly affected by urinary tract infections (UTIs) for which self-medication with antibiotics are a possibility. Overall, the sex of the respondents was not found to be a statistically significant determinant of antibiotic use.

Age was not found to be a significant determinant of antibiotic use ($p = 0.2806$) after adjustment. Age in many previous studies has been found to have varying effect on antibiotic use. Age was positively associated with a study in Sweden (Andre et al, 2010), Switzerland (Andre et al, 2010) and across Europe (Goossen et al., 2010). A study in Hungary however, found no association between age and antibiotic use (Goossen et al., 2010).

Highest level of education was statistically significantly associated with antibiotic use in both the adjusted and unadjusted models ($p < 0.001$). It would have been expected that higher levels of education should lead to reduced antibiotic use. This was found not to be so in this study with respondents with tertiary education having 8.35 (95% CI: 0.54–128.72) higher odds of antibiotic use compared to those with no education. This could be due to the fact that educated people may have better jobs and higher income and hence can afford to purchase antibiotics which can be relatively expensive.

The employment status of the respondents was significantly associated with antibiotic use ($p < 0.001$) in the unadjusted model with skilled workers having 5.6 (95% CI: 2.32 – 13.28) higher

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odds of using antibiotics compared to unemployed respondents. Although employment status overall was not found to be significantly associated with antibiotic use ($p = 0.873$) upon adjusting for age, sex, education, area of residence, insurance status, knowledge level and attitudes, manual workers were found to have significant association with antibiotic use ($p = 0.032$) with 3.48 (95% CI: 1.11 – 10.87) higher odds of using antibiotics compared to the unemployed. This is in line with the results obtained under the conditions for which respondents used antibiotics where majority of the respondents indicated that they took antibiotics to treat pain. Manual workers engage in a lot of physical work that could lead to pain at the end of the day. Given that studies have found that people find it difficult to differentiate between pain killers and antibiotics (WHO, 2015), manual workers may end up buying antibiotics instead of pain relievers to manage their pain leading to the high use of antibiotics with the associated antibiotic resistance.

Not having health insurance was found to be significantly associated with antibiotic use ($p = 0.035$) in the unadjusted model. This was however not the case after adjustment for factors such as age, sex, education, employment status, area of residence, knowledge level and attitudes. Being a holder of insurance card was not a significant determinant of antibiotic use in this study ($p = 0.851$). Area of residence of respondents was found to be significantly associated with antibiotic use in the crude analysis ($p = 0.005$) and after adjustment for potential confounders ($p < 0.001$). This could be explained by the fact that infection patterns change with geographical location. The higher the infection rates the more likely the chances of individuals using antibiotics (Haggett, 1994).

In the bivariate analysis, age, area of residence, insurance status, highest level of education and employment status were all positively associated with attitudes towards antibiotic use. Sex was

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found not to be associated with attitudes towards antibiotic use. This is not surprising since the attitudes of a person is a sum of their environmental, cultural, social and economic experiences which both sexes have an equal chance of exposure. Overall, attitude was found not to be significantly associated with antibiotic use ($p = 0.939$). This is in contrast to a study in Kuwait that found that participants had negative attitudes towards antibiotic consumption. A study in Hong Kong, UK, Sweden and Malaysia however found that the consumption of antibiotics was positively linked to the attitudes of participants (You et al., 2008; McNulty et al., 2007).

Insurance status, area of residence, employment status and highest level of education were all found to be significantly associated with the knowledge level of respondents ($p < 0.001$). Age and sex of respondents did not influence the knowledge level of the respondents. Knowledge of respondents was found not to be associated with antibiotic use in both the bivariate and logistic regression analysis. This is in line with many studies in developing countries where the use of antibiotics is independent on the knowledge of participants (Tagoe et al., 2010; Awad Al et al., 2015). Many studies also identified that knowledge and attitudes of participants were not always in line with their antibiotic use (Zafar et al., 2008; Suiafan et al., 2012). A study found that better knowledge about antibiotics among medical students did not decrease their prevalence of antibiotic use compared to non-medical students (Zafar et al., 2008; Suiafan et al., 2012).

Area of residence was found to be significantly associated with the use of antibiotics in this study. This compares to other studies that found that the place a participant resided was positively correlated with the use of antibiotics with people in rural areas more likely to use unprescribed antibiotics than people in urban areas (Berzanskyte et al., 2006). The area one

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resides has an influence on their health-related behavior, rate of infection, access to healthcare etc which all tends to affect antibiotic use.

5.5 Limitations of the study

This study should be interpreted bearing in mind the following potential limitations. The study design is cross-sectional and hence temporal associations cannot be established. The measure of antibiotic use was self-report (based on respondents�. telling the interviewer whether they had used antibiotics or not). This depends on the respondents‛ ability to remember information on their use of antibiotics leading to recall bias. There could be potential under-reporting on socially undesirable behaviors and over-reporting on socially desirable behaviors although this would be corrected to some extent with the use of identification numbers instead of the names of the participants. The time period used in collecting the information due to the cross-sectional nature of the study may not be the most appropriate since information on the knowledge and attitudes of respondents to antibiotic use could not be verified. Notwithstanding the above, the findings of this study provide useful information on the prevalence, knowledge, attitudes and practices that could be used as a basis for future studies and education on antibiotic use and antibiotic resistance.

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CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusion

This study found that majority of people still use antibiotics despite efforts of the Ministry of Health to create awareness on the use of antibiotics and potential association of antibiotic resistance. Augmentin/Amoksiklav was the commonly used antibiotics with majority obtaining their antibiotics on prescription. People however had good knowledge and attitudes towards antibiotic use. Highest level of education, area of residence and being a manual worker were found to be significant determinants of antibiotic use in this population.

6.2 Recommendations

A. MINISTRY OF HEALTH

- Current efforts by the Ministry of Health to educate the public on antibiotics use and resistance should be expanded and intensified. In addition, Non-Governmental Organizations and Civil Society Organizations should join the Ministry of Health to fight the development of antibiotic resistance.

B. PRESCRIBERS

- Prescribers should be encouraged to perform sensitivity testing before administering antibiotics.

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APPENDICES

Appendix A. Questionnaire for Quantitative Studies

School of Public Health

University of Ghana

College of Health Sciences

This questionnaire seeks to assess the factors influencing the use of antibiotics among adults in the Accra Metropolis. I wish to assure you that this is an academic study and all information provided shall strictly be used for academic purposes. You are also assured of absolute confidentiality and anonymity. There is thus no right or wrong answer.

Part 1 Socio – Demographic Characteristics

Please respond to the questions by ticking [√] the answer that reflects your opinion**.**

Location of residence….. Number of cluster……………………

Participant Number…..Language used in interview………………

Time interview started………… Time interview ended…………………

Name of interviewer…………… Date of interview…………………….

1. Gender. Male [ ] Female [ ]
2. In which year were you born?..................
3. What was your age at your last birthday?
   Age. 18 - 24 [ ] 26 -33 [ ] 34-40 [ ] Above 40 [ ]
4. What is your level of education?

   None [ ] Basic [ ] Medium [ ] Tertiary [ ]
5. What work do you do?

   Skilled worker [ ] Unemployed [ ] Manual worker [ ]

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6. Do you hold any form of insurance?

   Yes [ ]   No[ ]

Part 2 Antibiotic use

1. Do you use antibiotics?

   Yes [ ]   No[ ]

2. When was the last time you used an antibiotic?

   Currently using [ ]   last month [ ]   6 months[ ]

   One year [ ]   More than one year [ ]   Never[ ]

3. What type of antibiotic do you usually use?

   Penicillin[ ]   Augmentin/Amoksiklav[ ]   Ampicillin[ ]

   Cloxacillin[ ]   Cloxacillin[ ]   Others (please state type)……….

4. Did you buy the antibiotics with a prescription?

   Yes[ ]   No [ ]

5. Where did you buy or get the antibiotics?

   At the hospital [ ]   Community pharmacy [ ]   License chemical shop [ ]

   Street peddlers [ ]   Had at home [ ]   Friend or relative [ ]

6. What condition did you use the antibiotic to treat?

   Headache[ ]   Cold [ ]   Cough [ ]   Sorethroat[ ]

   Fever[ ]   Toothache[ ]   Stomach pain[ ]   itching[ ]
   Others[ ]

Part 3 knowledge about antibiotics

1. How long should I take an antibiotic for?

   Anytime I feel better [ ]   When I have taken all the antibiotics as instructed by doctor/pharmacist [ ]   Don‘t know [ ]

2. Antibiotics can be used to treat these diseases

   Bacteria infections [ ]   viral infections [ ]   headache [ ]   fever [ ]

   malaria [ ]   Diarrhea [ ]

3. I can take antibiotics from my friends and family when I have a similar illness

   Yes[ ]   No[ ]

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4. Do antibiotics have side-effects?
5. Yes [ ] No[ ]

Part 4 Knowledge about antibiotic resistance

1. Have you heard of the term antibiotic resistance?
   Yes [ ] No [ ]
2. Antibiotic resistance can occur when I don't use antibiotics the right way
   Yes [ ] No[ ]
3. Antibiotic resistance does not affect me, my family or friends
   Yes [ ] No[ ]
4. Antibiotic resistance is not a problem in Ghana
   Yes [ ] No [ ]

Part 5Attitude towards antibiotic use

		Strongly agree	Slightly agree	Neither agree nor disagree	Strongly disagree	Slightly disagree
1	It is okay to buy antibiotics without prescription					
2	Antibiotics can be taken anytime I feel sick					
3	I can give my left over antibiotics to friends and family complaining of similar illness					

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4	It is okay to ask a doctor to give me antibiotics when am ill					
5	It is always good to complete your antibiotic course					
6.	Antibiotics do not have any side-effects					
7	I will use antibiotics anytime am ill because it is safe					

Thank You for your participation.

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Appendix B. Participant Consent Form

Informed Consent Form

Title of project: Factors influencing the use of antibiotics among adults in the Greater Accra Metropolis.

Background

My name is Ama Akyampomaa Owusu-Asare, a student from the School of Public Health, University of Ghana, Legon. I am conducting a study on the factors influencing the use of antibiotics among adults in the Greater Accra Metropolis.

Procedures

The study will involve answering questions in the form of closed and open ended questionnaire. You are under no obligations to participate in the study. It will be appreciated if you could participate in this study. This is purely an academic research which forms part of my work for the award of a Master‘s Degree in Public Health.

Confidentiality and Anonymity

In this study, your anonymity is assured. We will not be collecting or retaining any information about your identity. The records of this study will be kept strictly confidential. We will not include any information in any report that may be published that would make it possible to identify you.

Risks and Benefits

The study when completed would inform health policy makers about the way antibiotics are consumed in Ghana and the necessary actions that ought to be taken to reduce the development

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of antibiotic-resistant strains thus acting as a feedback mechanism to health authorities. There are no risks associated with participating in this study.

Right to Refuse

Participation in this study is voluntary and you can choose not to answer any individual question or all questions. You are at liberty to withdraw from the study at any time. However, I will encourage you to fully participate in the study since your answers are much needed.

Before taking consent

Do you have any questions you wish to ask about the study? Yes/No

If yes, please, indicate the questions below………………………………………………….

…………………………………………………………………………………………………
………………………………………………………………………………………………...

Voluntary Consent

I have read the information given above, or the information above has been read to me and I understand. I have been given a chance to ask questions concerning this study; questions have been answered to my satisfaction. I now voluntarily agree to participate in this study knowing that I have the right to withdraw from this study at any time.

…………………………………. ………… ……………… …………..

Name of Respondent Date Thumbprint Signature

………………………………….. ……….. ……………… ……………..

Name of Researcher Date Thumbprint Signature

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Researcher's Statement

I, the undersigned, have explained this consent to the subject in English language/ Twi/ Ewe/Ga, and that she/he understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.

The participant has fully agreed to participate in the study.

Signature of Interviewer ……………………………………….

Date …………………………………

Address …………………………………………………….

If you have any questions please contact

Researcher: Ama Akyampomaa Owusu-Asare (0244213009).

Administrator of the GHS-ERC: 0243235225 / 0507041223