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SCHOOL OF PUBLIC HEALTH

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UNIVERSITY OF GHANA

ASSESSMENT OF AVAILABILITY OF ESSENTIAL MEDICINES IN PUBLIC HEALTH FACILITIES IN SEKONDI-TAKORADI METROPOLIS

BY

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DECLARATION

I Alfred Osei-Assibey confirm that this work is in my own words and that no part of it has been submitted anywhere for another purpose. Any uses made in this work from the works of other authors in any form have been properly acknowledged at the point of their use. A full list of the references employed have been included.

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(Student)

Signed…….. Date…….

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DEDICATION

I dedicate this work to my wife, Sena and my children Akua and Osei.

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I, first of all, thank the Almighty God for giving me the strength to complete this work successfully. Secondly, special appreciation goes to Dr Patricia Akweongo for guiding me through the stages of this dissertation. The faculty of the Department of Health Policy Planning and Management are greatly appreciated.

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INTEGRI PROCEDAMUS

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ABSTRACT

Essential medicines are selected to meet the priority health needs of majority of the population. The World Health Organization has set a benchmark of 80% availability of these essential medicines in health facilities. However, over 50% of the population in Low and Middle Income Countries still lack access with only about 30% of the medicines being available to them in both public and private health facilities. In Ghana, availability is still low with only about 17% of essential medicines available in public health facilities where majority of Ghanaians seek healthcare. Many factors contribute to this low availability in other parts of the world which includes financial factors on the part of health institutions to procure these medicines, affordability to the patients and supply chain and procurement factors. The objective of the study is to assess the availability of essential medicines in the Sekondi-Takoradi Metropolis. A descriptive cross-sectional study design was employed using mainly quantitative methods complemented with qualitative methods to assess the availability and affordability of 50 essential medicines in public health facilities the Sekondi-Takoradi Metropolis.

Fourteen public health facilities were selected to participate in the study. The World Health Organization and Health Action International Methodology, 2008 was applied in the study.

The availability of essential medicines Sekondi-Takoradi Metropolis was 64.5%. The most available essential medicines included Artemether Lumefantrine used to treat malaria. The results showed mean essential medicine availability of 64.5% for generic and 0.3% for originator brands. Median price ratios was 2.03 with 25th and 75th percentile price ratio of 1.43 and 3.17 respectively. Prices of essential medicines are two times higher than the international reference price published by Management Science for Health. The minimum wage earner requires 0.3 to 3 days' wage in order to buy essential medicines for the treatment of the common diseases in the Metropolis.

The procurement system is efficient with competitive procurement price similar to international prices published by the Management Science for Health. Prices of essential medicines remain high and strict adherence to medicine pricing policies is required to make medicines more affordable to low income earning Ghanaians.

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TABLE OF CONTENTS

University of Ghana http://ugspace.ug.edu.gh

University of Ghana http://ugspace.ug.edu.gh

University of Ghana http://ugspace.ug.edu.gh

University of Ghana http://ugspace.ug.edu.gh

LIST OF TABLES

University of Ghana http://ugspace.ug.edu.gh

LIST OF FIGURES

University of Ghana http://ugspace.ug.edu.gh

University of Ghana http://ugspace.ug.edu.gh

LIST OF ABBREVIATIONS

ACT	- Artemisinin-based Combination Therapy
AL	- Artemether Lumefantrine
CHPS	- Community-Based Health Planning Services
CMS	- Central Medical Stores
EML	- Essential Medicines List
EPI	- Expanded Program on Immunization
GHS	-Ghana Health Service
GNDP	- Ghana National Drug Program
HAI	- Health Action International
HIV/AIDS	- Human Immuno Deficiency Virus/Acquired Immune Deficiency Disease
MDG	- Millennium Development Goal
MOH	- Ministry of Health
MSH	- Management Sciences for Health
NHIA	- National Health Insurance Authority
NHIS	- National Health Insurance Scheme
OPD	- Out Patients' Department
PATH	- Performance Assessment Tool for quality improvement in Hospitals
PPA	- Public Procurement Authority
RMS	- Regional Medical Stores
SDG	- Sustainable Development Goals
SSNIT	- Social Security and National Insurance Trust
STMA	- Sekondi-Takoradi Metropolitan Assembly
TRIPS	- Trade Related Aspects of Intellectual Property Rights
UK	- United Kingdom
UN	- United Nations

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US	- United States
WHO	- World Health Organization
WRHD	- Western Regional Health Directorate
WTO	- World Trade Organization

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DEFINITION OF TERMS

Essential Medicines: Medicines that meet the priority health needs of majority of the population, which are selected based on their proven efficacy and safety, and cost-effectiveness.

Availability: The presence of unexpired medicine in a health facility at the time of survey

Affordability: The number of days a public servant earning the prevailing government minimum wage will have to work to be able to afford the standard treatment of a selected essential medicine.

Effectiveness: Describes the continuous availability of essential medicines in a health facility, thus the number of days of stock out of an essential medicine describes the effectiveness of the supply chain system.

Efficiency: Describes the ability of the procurement system to offer cost effective medicines to the patients in a health system. It is measured by the median price ratio of essential medicines

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CHAPTER ONE

INTRODUCTION

1.1 Background

Medicines or pharmaceuticals are a key component of any health delivery system. It may be used for curative, adjuvant treatment, diagnosis and prevention of diseases. The World Health Organization (WHO) has advocated for the constant availability of a group of medicines classified as Essential Medicines(Gray, Wirtz, 't Hoen, Reich, & Hogerzeil, 2015). These are medicines that are selected to meet the priority healthcare needs that contribute to better healthcare, better drug management, better use of financial resources and thereby improving access to care. They are selected with due regard to disease prevalence, evidence of efficacy and safety, and comparative cost-effectiveness. The WHO has a model list from which countries have developed their National Essential Medicines Lists and has set an 80% benchmark as acceptable limit for essential medicines availability in member countries(World Health Organization & Health Action International, 2008).

The Millennium Development Goal (MDG) 8e states that in cooperation with pharmaceutical companies, countries should make essential medicines accessible and affordable (Seuba, 2006). In spite of the implementation of essential medicines policies since 1977, a third of the world's population lack access to essential medicines with about 50% of the Africans and Asians not having access (Quick, Hogerzeil, Velasquez, & Rago, 2002). Ghana has developed this list with the first edition in 1988, and revised subsequently through 1993, 1996, 2000, and 2004 to 2010 (Ministry of Health, 2010). There is generally low availability of essential medicines in Sub Sahara Africa. Availability of essential medicines is strikingly low,

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with over 30% of those expected to be available not at the facility levels (Masters *et al*., 2014)

1.2 Problem Statement

In Ghana, medicines take up to 60 to 80% of healthcare cost(Ghana National Drugs Programme, 2004). With the introduction of the National Health Insurance Scheme (NHIS), facilities are reimbursed for cost of services including cost of essential medicines through the NHIS claims submitted to the National Health Insurance Authority (NHIA) with about 50% of reimbursement allocated to medicines. Majority of Ghanaians, about 55%, obtain pharmaceutical service from public health facilities to take care of diseases such as malaria, upper respiratory tract infections, diarrhoeal diseases, skin infections and hypertension, among the top five diseases reported at health facilities' Out Patients Department (OPD) (Ministry of Health, 2009)

The median availability of essential medicines for low and middle income countries is 56% and Ghana have been reported to have 17.9% in public health facilities and 44.6% in private facilities (World Health Organization, 2014). Data required for estimation of essential medicine availability remains low and sometimes unavailable due to lack of monitoring (United Nations, 2015b). Ghana continues to lag in the median and mean availability of essential medicines at service delivery points(World Health Organization, 2010). It was envisaged that about 10 million deaths could occur in each year by 2015, globally if efforts were not taken to improve on availability of essential medicines to the population, especially through communicable, non-communicable and maternal health intervention programs (Quick *et al*., 2002). Drug availability is affected by factors such as the disease burden, availability of funds to procure them, the efficiency of the procurement and medicines distribution system

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and other factors (Ghana National Drugs Programme, 2004; Sinclair *et al.*, 2013; World Health Organization, 2015b).

The Sekondi-Takoradi Metropolis has a total of 30 health facilities, with a mix of 24 primary, 5 secondary and 1 tertiary level facilities of which some are NHIS accredited and others not accredited. This mix will allow a fair assessment of the availability of essential medicines since patients seek care from all these health facilities. Low availability of essential medicines reduces the level of confidence the people have in the health system to deliver effective care and this could derail effort to attain universal coverage as agreed at Alma-Ata.

This study seeks to assess the availability of Essential medicines in public health facilities in the Sekondi-Takoradi Metropolis

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1.3 Conceptual Framework of Factors Affecting Availability of Essential Medicines in Sekondi Takoradi Metropolis

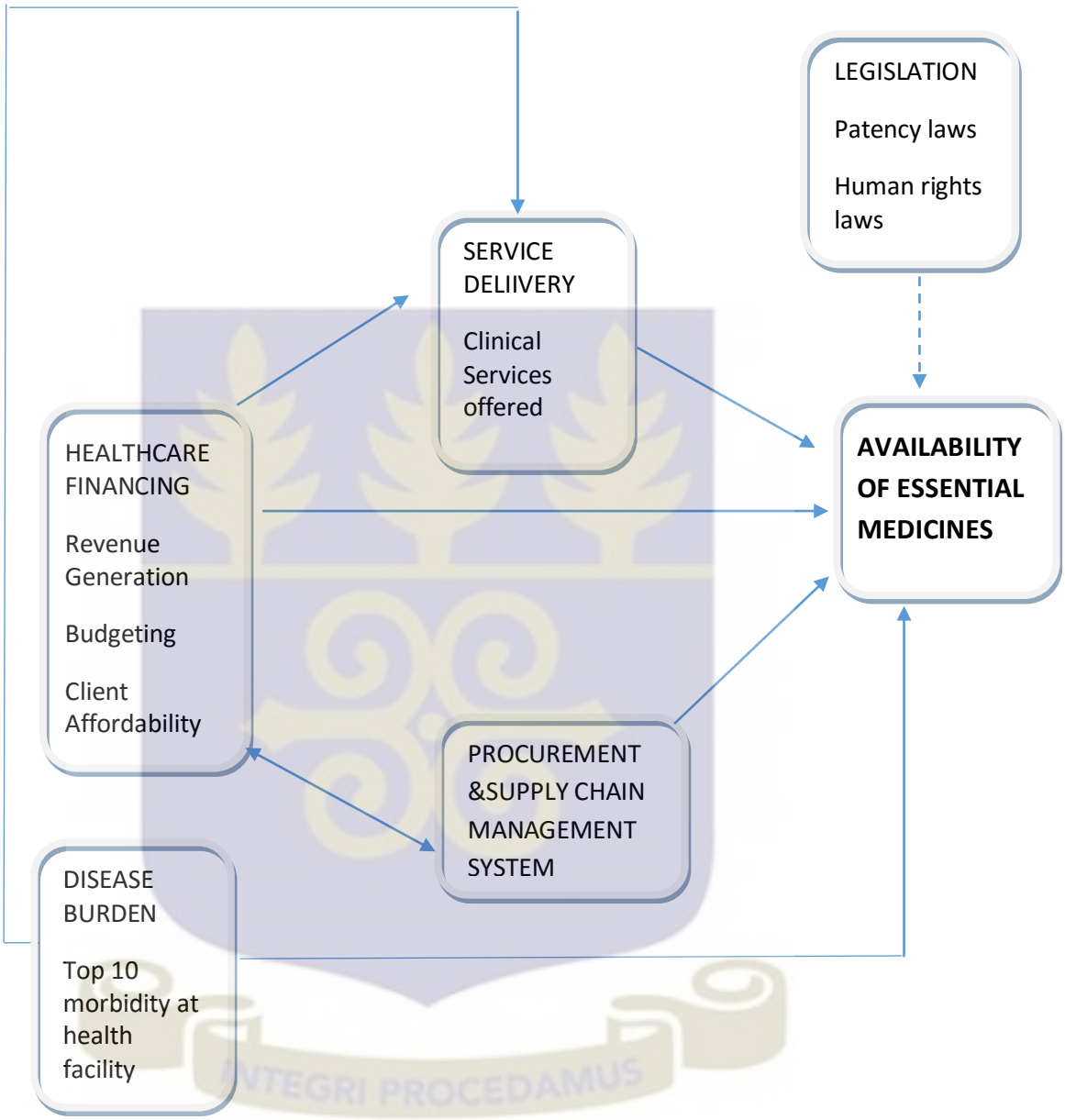

Figure 1: Conceptual Framework of Factors affecting Essential Medicines Availability

The conceptual framework (Figure 1) describes the factors that affect the availability of essential medicines. Central among them are the financial factors which have a direct bearing on availability. The affordability of medicines may affect the availability of it to the patient/client who is the overall beneficiary, in that, medicines

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could be available at the health facility but the client will not have access to it due to his or her inability to pay (Ministry of Health, 2009; World Health Organization, 2010). This may apply greatly to non NHIS card holders who have to do out-of-pocket payment. Some NHIS card bearers could also be denied access if prices of medicines are above the NHIS approved rates. The availability of funds to the facility, in terms of NHIS reimbursement and funds from out-of-pocket payment has a bearing on the facilities' ability to procure essential medicines and the timeliness of payment affect the procurement planning process.

Proper planning and budgeting is expected to impact on the availability of funds for procurement of medicines. Poor planning will result in delays in procurements and underestimation of requirements (Ameyaw, Mensah, & Osei-Tutu, 2012)

Disease burden also informs the kind of medicines to stock in a facility. This factor also has an effect on procurement planning. An outbreak of a disease may negatively affect stocks of medicines to treat or control the outbreak. The disease burden also impacts on the kind of other clinical services that are available, for example, high malaria burden requires the availability of efficient and effective laboratory services to properly diagnose malaria. The availability of these other services draws more clients to the facility, thus, improving revenue generation to make more funds available for procurement of essential medicines (Atun *et al.*, 2013; Cameron *et al.*, 2011; Robertson, Forte, Trapsida, & Hill, 2009).

The supply chain system challenges which include storage and distribution challenges also affect the availability of essential medicines in health facilities and to the final consumer as well. For example, poor transportation systems do not make medicines available at the point of use. Low storage capacities of warehouses and stores may

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also limit the volumes to be procured. Procurement planning is adversely affected in this case. The procurement methods adopted by the country impacts on the availability of medicines at the right time when they are needed (Ameyaw *et al.*, 2012; Bhakoo & Chan, 2011; Zaffran *et al.*, 2013). Another emerging area is the influence of legislation on the availability of essential medicines. Whiles patency rights and laws may restrict access to some medicines, the human right laws have inculcated the need for equity in the access to essential medicines (Seuba, 2006; Smith, Correa, & Oh, 2009). However, the scope of this research does not include the influences of legislation on availability in the Sekondi-Takoradi Metropolis

1.4 Justification

Data on availability of essential medicines is limited in low middle income countries (World Health Organization, 2010). This lack of information may result in poor decision making resulting in a vicious cycle of unavailability of medicines and poor planning and decision making. The study will highlight the state of public health facilities' capacity to cater for the basic essential medicines needs of majority of the population in Sekondi Takoradi. It will also provide information on how available and affordable essential medicines are in the metropolis and this will be useful in understanding prescription pattern of practitioners and inform prescription patterns. Information gathered on the trend of availability of essential medicines will also inform health managers on the outcomes of measures put in place over the years to make essential medicines available.

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1.5 Objectives

The objectives of the study describes the purpose of the study and it has been categorized as the general objectives and the specific objectives.

1.5.1 General Objectives

- To assess the availability of essential medicines in Public health facilities in Sekondi-Takoradi Metropolis

1.5.2 Specific Objectives

The specific objectives are to:

1. Assess the trends of availability of essential medicines in health facilities in Sekondi-Takoradi Metropolis from 2011 to 2015.
2. Assess affordability of essential medicines to patients of public health facilities in Sekondi-Takoradi Metropolis
3. To assess the effectiveness and efficiency of the procurement and supply chain system in public health facilities in Sekondi-Takoradi Metropolis

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CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter provides a review of existing literature that relates to assessment of essential medicines availability and factors that affect availability. It discusses factors such as disease burden, health care financing, governance and leadership, access to essential medicines and affordability of essential medicines. The section also describes the methodology employed in affordability, availability and price surveys adopted by the World Health Organization.

2.1 The Disease Burden

The global burden of non-communicable disease has risen from 43% in 1990 to 57% in 2010 and has accounted for deaths of 57.2% in 1990 to 65.5% in 2010 (Atun *et al.*, 2013). The pattern of disease in Africa's population is that of a double burden, with chronic non communicable diseases increasing rapidly and the age-old communicable diseases still unresolved as a result of prevailing poverty. For some countries like South Africa the HIV/AIDS pandemic and the growing incidence of injuries could make the description of the pattern a quadruple burden (Doyal & Hoffman, 2009).

Three leading risk factors for the global disease burden is high blood pressure, smoking, including passive smoking and household air pollution from solid fuels. In Sub Sahara Africa, childhood underweight, household pollution and non-exclusive and discontinued breastfeeding are major risk factors. Other factors are those related to poverty. The trend of diseases has enormously changed from communicable diseases in children to non-communicable diseases in adults (Lim *et al.*, 2012). The

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burden of cancer for example is increasing in Africa with the rates doubling in the last 20 years, even though not comparable to higher values among black people in United States. Eighty percent of patients are diagnosed in the advanced stages of the disease and may only require palliative care. Pain relieving medicines like morphine is crucial in improving the quality of life of these patients. In 2008, only 10% of the required quantity of morphine was made available to terminal cancer patients in Africa. The unavailability of these medicines adversely affects the quality of life of these cancer patients and some HIV/AIDS patients who require the medication (Jemal *et al*., 2012).

In Ghana, the increasing incidence of chronic diseases is associated with the socio-demographic and socio-economic factors such as age, sex, religion, marital status, and occupation, level of education and income levels. A cohort study of 30000 individuals followed for 9years in Ghana, found a shifting trend in the cause of death of individuals from infectious diseases to non-infectious diseases (Engelaer, Koopman, van Bodegom, Eriksson, & Westendorp, 2014). The health services to cater for this changing trend, especially at the primary level has been found to be not accessible, not equitable and not responsive to the target population (de-Graft Aikins, Kushitor, Koram, Gyamfi, & Ogedegbe, 2014).

The disease burden is a major factor in deciding the essential medicines that are available at any point in time. There is evidence that the availability of essential medicines differs on the basis of the prevalence of certain diseases. There is a substantially high difference of about 40% in the availability of essential medicines for chronic and acute disease conditions in Africa (Cameron *et al*., 2011). The trend could be explained by the initial emphasis placed on treatment of communicable diseases, most of which are acute. The trend was similar in other low income parts of

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the world (Cameron *et al*., 2011). A study suggested that countries need to urgently amend their essential medicines lists to provide all priority medicines as part of the efforts to improve maternal and child health (Hill, Yang, & Bero, 2012). In Sekondi-Takoradi where this study was conducted, data gathered from the District Health Information Management System version 2 (DHIMS2) indicated that communicable diseases that were non immunizable made up to about 68% of all reported diseases in 2014 compared to about 9% for non-communicable diseases. The inclusion of newer medicines like Bedaquiline and Delamanid for treatment of drug-resistant Tuberculosis and Directly Acting Antiretrovirals for hepatitis C, even though they are expensive, explains the role the disease burden plays in the selection of essential medicines since these disease conditions have become public health threats (Gray *et al*., 2015)

2.2 Access to Essential Medicines

Accessibility of essential medicines refers to availability and affordability of the selected medicines that are used to treat and diagnose diseases that affect majority of the population. There are a lot of medicines, both orthodox and traditional, produced by various countries and ethnic groups across the world. In 1970, the World Health Assembly discussed the concept of Essential Medicines following unfavorable precedence in some European countries and developing countries (Gray *et al*., 2015).

The first essential medicine list was therefore developed in 1977 by the WHO following the outcome of the World Health Assembly in 1970 (Gray *et al*., 2015). This is a list of medicines that satisfies the priority medicine needs of majority of the population. This document has encouraged countries to develop National Essential Medicine List (EML). About 192 countries have developed their national EMLs as at

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2002. It should be noted that having an EML does not guarantee the availability of essential medicines in health care facilities (Bazargani, Ewen, De Boer, Leufkens, & Mantel-Teeuwisse, 2014). There must be a conscious effort to ensure that health service delivery points have these medicines constantly available. The WHO encourages countries to generate their EMLs from the model list, as generating the list is a first step in addressing access to medicines relevant for almost all citizens of the country. It must be noted that WHO does not only add medicines that are favorable to resource-constrained settings but it is evident that in 2002, 12 new and expensive antiretroviral medicines were added to the list(Gray *et al.*, 2015). The rationale according to the WHO is to ensure that good and effective medicines of public health interest are made available to the world's population. Inclusion of the medicine in the list is a key step to ensuring this mandate. The strategy is also to include these newer and expensive medicines on the list in 2015 in order to allow for practitioners to try out various combinations of therapy of single and newer molecules to build sufficient data on newer medicines, for example hepatitis C, a disease which is still being studied for better and efficient treatment options (Gray *et al.*, 2015).

Bazargani, *et al* (2014) revealed that the median availability of essential medicines was suboptimal at 61.5% but significantly higher than non-essential medicines at 27.3%. In Ghana, the availability of essential medicines in private facilities is higher than in public facilities both in the rural and urban areas (Ministry of Health, Health Action International, & World Health Organization, 2008). Access to medicines and vaccines to treat and prevent non-communicable diseases is unacceptably low (Hogerzeil *et al.*, 2013).

Most of Africa's essential medicine needs are imported from India (Smith *et al.*, 2009). The capacity of local pharmaceutical manufacturers to meet demand is low. It

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is estimated that the local pharmaceutical industry have capacity to produce 30% of the country's requirements (Asamoah, Annan, & Nyarko, 2012). With the introduction of the World Trade Organization's Trade Related Aspects of Intellectual Property Rights (TRIPS), importation of generic medicines from India may be limited(Smith *et al*., 2009).

2.3 Selection of Essential Medicines

The concept of essential medicines was based on a precedent of events in North America, Scandinavia and some developing countries to bridge the wide gap between beneficiaries of pharmaceuticals and those who did not benefit in the mid-1900s. Essential medicines are selected based on specific considerations. The WHO, since 1977, in two yearly intervals, has continuously reviewed the Model Essential Medicines List. Selection is based on the diseases of public health interest that affect substantial segments of the population, evidence of efficacy, safety and comparative cost-effectiveness(Quick *et al*., 2002). Medicines that meet the criteria are selected by an expert group of the WHO. This serves as a guide to member countries to develop and update their national essential medicines lists.

In recent times, the inclusion of some medicines like anti-cancer and antiretrovirals in the WHO Model List has questioned the criteria of cost-effectiveness. Cost effectiveness at the global level may not necessarily be the case at the country, and sometimes the community level. Efficacy and safety have also been based on results of randomized-controlled trials and systematic reviews, and the performance of the medicines used in different clinical settings (Gray *et al*., 2015). The development and approval for use of many new medicines by various drug regulatory agencies each year, coupled with changing evidence of efficacy and safety of existing essential

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medicines and changing economic status of economies call for regular review of the essential medicine list at all levels, including global, continental, national and facility levels.

The WHO expert committee was convened in April 2015 to review the 18th Model Essential Medicine List. The review resulted in a recommendation for the addition of 36 new medicines to the list in the 19th Model Essential Medicine(World Health Organization, 2015a). In Ghana, the GNDP, has developed the list up to its sixth edition in 2010, which is the current list applied in this research.

Selection is also based on the level of expertise of the user facility. In Ghana, essential medicines have been classified based on the minimum level of the health care delivery system where the drug can be used. The levels are indicated in Table 1:

Table 1: Classification of Essential Medicines according to level of care

Level of Care	Description
A	Community level(Community-based Health Planning Services)
M	Maternity home
B1	Health Centre without a doctor
B2	Health Centre with a doctor
C	District hospital
D	Regional/Teaching hospital
SD	Specialist drug
PD	Programme drug

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The capacity of a health facility to manage complications that arise from the use of the particular medicine informs the limitations placed on its use, even though it may be classified as an essential medicine at that particular health service delivery level.

In selection, the WHO and Health Action International (HAI) have suggested classification of essential medicines to cater for global and continental or regional levels (World Health Organization & Health Action International, 2008). It is expected that countries should have some medicines that reflect the global burden of diseases and also medicines that reflect the continental or regional burden of disease. The global core list of medicines is made up of 14 medicines, whiles the regional core list is made up of 16 medicines. The remaining list of 20 medicines form the supplementary list which describes the local list of medicines. The WHO/HAI recommends that these 50 medicines are always available in the country and they form the basis for availability and affordability studies.

2.4 Healthcare Financing

The per capita spending on health care continues to be low in most African countries as depicted in Figure 2. Most countries in Sub Sahara Africa spend less than $25 per capita on healthcare compared to $300 in Asia and more than $1000 in United States, United Kingdom and Germany (World Health Organization, 2010). The WHO in its 58th round of World Health Assembly encouraged members to strive to attain universal coverage through equity and financial risk protection in obtaining health services. Countries, such as Thailand that has attained this universal coverage focused on not only making funds available, but also ensuring efficiency and quality of care in service delivery.

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Healthcare cost continues to rise even though a lot more drug patents expire. The high cost of some drugs has been attributed to recovery of research and development cost through patency rights. In the US, drug component of the slowly rising healthcare cost is higher, accounting for 3.2% out of the 4.2% of health care cost increase(Lyle & Caskey, 2014) In Ghana the cost of medicines is estimated to make up 60 to 80% of the healthcare cost (Ghana National Drugs Programme, 2004). The estimate may be similar in other African Countries. Access to essential medicines has largely been financed by the National Health Insurance Scheme in Ghana since 2004 (Sinclair *et al*., 2013).

Ghana's health financing has transitioned through the era of free medical services including medicines financed by tax revenues in the 1950 to mid-1960. In the early 1970 the government of the day introduced some cost sharing due to stagnating tax revenues and subsequent abolishing of the free medical service in the 1980's to 2003 in public health facilities (Agyepong & Adjei, 2008). Selection of essential medicines is based on efficacy and affordability for the majority of the population. . Most countries in the world today are shifting to mechanisms of payment that does not require patients paying out-of-pocket for healthcare at the point of delivery of the service, thus encouraging risk sharing mechanisms for service and medicines. Low-Income Countries required an average of $60 per capita by 2015 on healthcare in order to achieve the health MDGs, of which ensuring availability of essential medicines was key, compared to the $32 per capita prevailing (World Health Organization, 2010).

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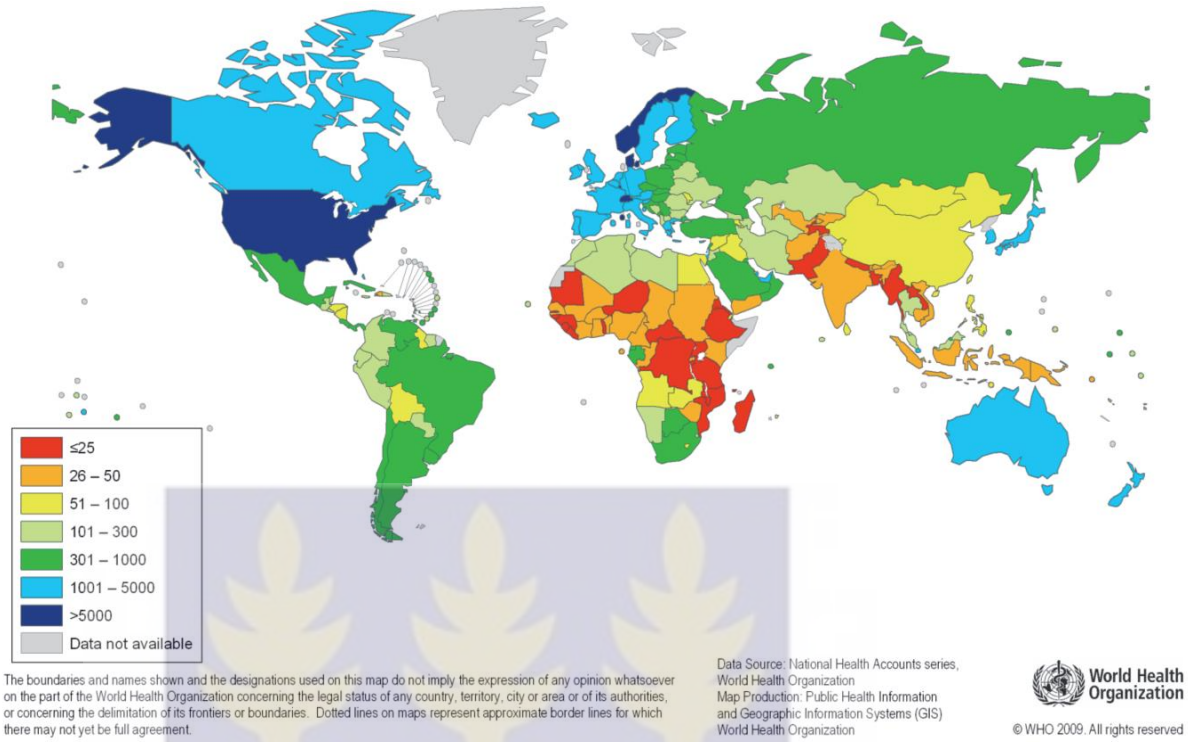

Figure 2: Total expenditure on health per capita, 2006 (in US$)

The NHIS was introduced in Ghana, in 2004, to remove the financial barrier in seeking healthcare, with emphasis on the poor, children under 18yrs, pregnant women and those 70years and older. Subscribers in the informal sector pay a premium of about GHS12.00 for a year, and the formal sector who contribute to the Social Security and National Insurance Trust (SSNIT) contribute 2.5% of their monthly social security deduction to the NHIS fund and that gives them access to a wide range of health services both primary and secondary including medicines. Enrolment on the NHIS has been shown not to meet the needs of the poor and variations in regional enrolment also suggests other reasons for which people may not enroll on the scheme, (Dixon, Tenkorang, & Luginaah, 2011). The NHIS has in recent times suffered criticisms for late reimbursement for services rendered to its clients by many health facilities. This has led to some health facilities denying NHIS card bearers of health services including medicines.

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Countries that have achieved universal coverage in recent times, like Thailand, have been through rigorous planning with emphasis on making essential medicines affordable and available. Prices of pharmaceuticals have had strict controls from the national level. In Ghana there is not much control on the price of pharmaceuticals, even in the public sector. This has led to wide variations in prices of medicines and a further over pricing of medicines in most parts of Ghana. The consequence of over-pricing is a further reduced access to the poor in the society and leading to impoverishment of families as a result of financing their medicine costs (Ministry of Health, 2009).

Other forms of financing options that make services affordable have also been adopted by other countries. An example is the complete removal of user fees off some health services and other privately financed insurance schemes in private health facilities (Lagomarsino, Garabrant, Adyas, Muga, & Otoo, 2012).

Cost of medicines is one major factor hindering availability of essential medicines to patients, especially people living in developing countries. The overall objective of health financing schemes is to reduce financial catastrophe associated with paying for health services and medicines (World Health Organization, 2010). About 11% of the world's population suffers this catastrophe, while 5% are forced into poverty as a results of paying for healthcare including medicines. In Ghana, the public sector in urban areas has the highest medicine prices whiles the private sector has the lowest (Ministry of Health, 2009).

The World Health Organization and Health Action International (WHO/HAI) 2008 methodology measures affordability by calculating the number of days of wages the lowest paid government worker will have to work to afford a standard course of

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treatment as indicated in the standard treatment guidelines. Prices of lowest priced generics vary widely among health facilities. The National Health Insurance Scheme was introduced in 2004 to make medicines affordable to patients but ironically, 20% of essential medicines on the list were found to be above the median market price of the medicines (Ministry of Health *et al.*, 2008). There are various methods of measuring affordability of medicines. The WHO/HAI methodology relies on the number of days' wage the Lowest Paid Government Worker (LPGW) or the minimum wage earner works to pay for the price of a particular medicine. Other complex methods include the catastrophic payment method that looks at the proportion of total household expenditure on medicines and the impoverishment method that focuses on households residual income after a particular medicine has been procured (Niens *et al.*, 2012)

2.5 Availability of Antimalarials

Malaria continues to be the most diagnosed disease in Ghana, accounting for about 40% of Outpatient Department (OPD) cases and 35.2% of admissions in health facilities across the country (Malm *et al.*, 2013) and thus is among the top 5 causes of morbidity in the country. It also accounts for 17.1% of in-patient mortality in hospitals in Ghana (Ministry of Health, 2007). Therefore availability of antimalarial medicines and preventive materials like Insecticide Treated Nets (ITN) is crucial in managing cases and preventing infections. The development of resistant strains of the plasmodium parasite led to the introduction of the Artemisinin-based Combination Therapy (ACT) as first line treatment for uncomplicated malaria in most endemic areas in the world, including Ghana which introduced the ACTs in 2004 (Malm *et al.*, 2013). Availability of ACTs in Ghana, increased from 31% in 2009 to 83% in 2011

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nationwide (Malm *et al*., 2013). The increase in availability was due to the introduction of the Affordable Medicines Facility for Malaria in Ghana by the Global Fund. This led to a drastic reduction of ACTs from $5.0 to $0.5 for paediatric formulations and $7.0 to $0.75 for adult formulations (Malm *et al*., 2013).

Availability in public and private sectors in Ghana was 80.70% and 82.60% (Tougher *et al*., 2012). However, in other African countries including Nigeria, Kenya and Democratic Republic of Congo availability of ACTs is higher in public health facilities, between 43% and 85% compared to less than 25% in private facilities (O'Connell *et al*., 2011). Antimalarials, specifically, Artemether Lumefantrine continues to be the most prescribed medicine in Ghana, accounting for about 63.1% of all medicines prescribed for patients who visit the hospital (Afriyie, Amponsah, Antwi, & Nyoagbe, 2015). Afriyie *et al* (2015) indicated that quinine, which is the antimalarial of choice in the first trimester of pregnancy and in severe malaria also accounted for 0.6% of prescribed antimalarials.

Shortage or stock-out of medicines in the health facility can have dire consequence on the health system including loss of confidence in the health system by patients and health workers alike. This may derail efforts at achieving universal coverage in healthcare. A survey conducted in the US revealed that the labour cost of managing drug shortages was about $216 million annually and information systems to manage shortages were inadequate (Kaakeh *et al*., 2011).

2.6 Health Action International Methodology for Measuring Price, Affordability and Availability of Essential Medicines

The Health Action International is a non-governmental organization established in 1981 which is entirely focused on medicine policies to improve public health around

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the world. In its resolution 54.11, the World Health Assembly in 2001 requested the Director General

> "*to explore the feasibility and effectiveness of implementing, in collaboration with nongovernmental organizations and other concerned partners, systems for voluntary monitoring drug prices and reporting global drug prices with a view to improving equity in access to essential drugs in health systems, and to provide support to Member States in that regard".*(World Health Organization & Health Action International, 2008).

This led to the establishment of the World Health Organization and Health Action International (WHO/HAI) Project on Medicines Price and Availability in 2001 with a clear objective to:

1. develop a reliable methodology for collecting and analyzing medicine price, availability, affordability and medicine price component data across health-care sectors and regions in a country,
2. publish survey data on publicly accessible website to improve transparency in medicine prices, and
3. advocate for appropriate national policies to monitor their impact.

In phase1 of the project, a group of experts developed a methodology that was tested in Ghana, Sri Lanka, Armenia, Brazil, South Africa, Kenya, Cameroon and Philippines (World Health Organization & Health Action International, 2008). The methodology was launched in 2003 as a draft manual with a Microsoft Excel workbook that analyses data collected. During the 2nd phase of the project, studies were undertaken to validate the methodology, volatility of the reference prices and to compare the actual prices paid with those collected by data collectors. The results confirmed the strength and appropriateness of the WHO/HAI methodology.

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The methodology samples availability and price data from at least six sample areas of a country or province and selects medicine outlets from three categories as public, private and other sectors collecting data on 50 essential medicines. Selection of medicines is based on a pre-classification of essential medicines into Global core medicines which are 14, Regional core made up of 16 essential medicines and a supplementary list of 20 essential medicines from the locality of the survey. Price data are collected for both the originator brand and the lowest priced generic brand of the medicine at the time of the survey. The WHO through Management Sciences for Health (MSH) has set reference prices of medicines which is updated periodically based on procurement prices from not-for-profit organizations involved in medicine donations.

Affordability in this methodology also compares the number of days the lowest paid public servant will work in order to pay for a standard treatment course of a medicine. As of 2007, over 50 price and affordability surveys had been conducted across the globe showing that high medicines price in the private sector was about 80times more than the international reference price in most low and middle income countries. Similarly, availability is startling low, and sometimes no essential medicine is available in some public health facilities. Treatments are often unaffordable, requiring the lowest paid government worker to work for 15 days in order to pay for a one month supply of an essential medicine. Findings from these surveys have stimulated action in some countries where for example Indonesia reduced prices of generic medicines by about 85% to ensure that medicines are available to the population (World Health Organization & Health Action International, 2008).

Other price surveys have adapted the WHO/HAI methodology. In Nepal and Nicaragua, John Snow International and PATH utilized the methodology, just as the

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WHO's Non-communicable Diseases and Mental Health Cluster used it (World Health Organization & Health Action International, 2008).

2.7 Legislation

Access to essential medicines has assumed human rights dimensions through collaborative efforts between the World Health Organization (WHO) and United Nations (UN). The UN International Committee on Economic, Social and Cultural Rights states that the right to health includes the availability, accessibility and quality of health goods, services and programs which is synonymous to the WHOs statement on essential medicines which states that essential medicines are intended to be available within the context of health systems in adequate amounts at all times, in appropriate dosage forms, with assured quality and information, and at a price that the individual and community can afford (Seuba, 2006).

2.7.1 Patency Laws

The millennium development Goal 8e, focused on making essential medicines available to the poor and marginalized in the society. It states, "*In cooperation with pharmaceutical companies, provide access to affordable essential medicines in developing countries"*. The proportion of the population with a sustainable access to essential drugs was measured in 2015 to ascertain progress (United Nations, 2015b). Surveys conducted between 2007 and 2013 revealed that only 55% of essential medicines were available in 21 middle-to-Low Income Countries. The trend is worrying in these deprived countries which have high disease burden.

Members of the World Trade Organization have agreed to the tenets of the Trade-Related Aspects of Intellectual Property Rights (TRIPS), which is intended to protect

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intellectual property including pharmaceuticals. It has set the minimum standards of intellectual property protection. This gave a 20-year trade protection for pharmaceuticals from 1995. This trade agreement when applied has a positive impact on the developed countries who produce majority of the world's needs of pharmaceuticals. Over 75% of the world's pharmaceutical sales are in the developed world. The introduction of TRIPS seems not to have affected this trend. Developing countries may not benefit from this trade agreement because developed countries produce, use and export high value patented medicines while the developing countries import and produce low value generic medicines resulting in a trade deficit in modern and effective medicines (Flynn & Hollis, 2013; Smith *et al*., 2009). Poor countries were granted a temporary exemption from the TRIPS regulation on medicines until the end of 2015. Expiration of this exemption meant poorer access to even generic versions of drugs such as antiretrovirals to treat HIV/AIDS which is endemic in low income countries.

2.7.2 Human Rights Laws

Although the selection criteria for medicines on the WHO model essential medicine list considers efficacy and cost of the medicine as key determinants, current trends show that patented and expensive medicines can be found on the WHO model list. The WHO is moving towards a selection criteria of much focus on need and not cost. As stated by the UN Sub-Commission on Promotion and Protection of Human Rights, the right to protection of moral and economic interest resulting from scientific research is a human right subject to public interest limitations (Seuba, 2006).

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Other schools of thought suggests that medicines for which clinical trials were conducted in some low or middle income country, there is the need to make such medicines much more affordable to these countries since they contributed to generating the knowledge that is expected to be patented (Seuba, 2006).

2.8 Medicine Procurement

In most developing countries, pharmaceutical procurement forms a large component of the healthcare cost after personnel cost (Ministry of Health, 2009; World Health Organization, 2010). Governments have devised means of regulating procurement in order to reduce the overall cost of procurements in the public sector. In Ghana, the Public Procurement Law, Act 663 regulates the procurement of medicines in the public health facilities (Ameyaw *et al.*, 2012). The Central Medical Stores (CMS), at the national level procures locally and internationally all medicines relevant to the public health system. Then Regional Medical Store (RMS) also procures from the CMS and local pharmaceutical manufacturers and wholesalers. The Public Procurement Authority (PPA) is the body mandated to oversee all public procurements in Ghana, including, medicines. Procurement is decentralized in most sectors of the country but each level has threshold of amount to procure at a given time.

Corruption in public procurement may account for a 20% to 30% increase in contract sums, resulting in an increased price of essential medicines (Ameyaw *et al.*, 2012). A study in Ghana has shown that there is a deliberate effort to make public procurements less competitive. This defeats the tennets of ACT 663 to ensure value-for-money to end-users of commodities procured (Ameyaw *et al.*, 2012). Lack of trained procurement personnel has also been found to hamper the smooth

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implementation of the law (Ameyaw *et al*., 2012). The same study by Ameyaw *et al* (2012) also realized a higher preference for sole sourcing as a procurement method. This has a tendency of suppliers quoting higher prices. Other competitive methods such as request for quotations, national and international competitive bidding when employed will bring about value-for-money in public procurements.

2.9 **Supply Chain System**

An effective logistics system makes commodities available to end user at the time it is required. The supply chain system consists of players at the central level down to the health facility level. It consists of all activities associated with the flow and transformation of goods from the raw material stage through to the end-user (Haszlinna Mustaffa & Potter, 2009). The Central Medical Stores procures medicines for the entire country based on aggregated commodity utilization from the regional medical stores and teaching hospitals. The regional medical stores supply medicines to the public and sometimes, private health facilities in the region. However, all facilities are able to procure medicines from the private pharmaceutical manufacturers and wholesalers (Adu-Poku, Asamoah, & Abor, 2011).

Shortage of drug products is a major factor impeding the smooth delivery of health services in many parts of the world, including the developed world(Fox *et al*., 2009). It is an important measure of the effectiveness of the supply chain procedures in any health system. Shortages could emanate from many of the components of the system, active pharmaceutical ingredient manufacturers, finished product manufacturers, wholesalers, end-user facilities and from regulators of the pharmaceutical industry. Shortages lead to an increased cost of delivering health services. This happens directly through single sourcing of medicines from non-traditional distributors at

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higher cost and indirectly on the patients' therapy, where the patient may have to acquire an alternative, which might be expensive. A shortage at the higher levels of the chain affects greater portions of the population. This leads to dissatisfaction among all individuals in the supply chain continuum (Fox *et al*., 2009).

Countries, including Bangladesh, Malawi, Cambodia, and Tanzania have channeled investment in HIV/AIDS and Tuberculosis to improve areas of the health system including the supply chains management and this has yielded good results.

Another vital aspect of the supply chain system is the distribution of medicines from various warehouses to the service points where patients can get access. Distribution is challenging in most developing countries as described by Fox *et al* (2009). Poor road network, coupled with limited distribution vehicles, trucks and vans, of wholesalers negatively affect the availability of essential medicines (Fox *et al*., 2009). Typical example is with the implementation of the scheduled delivery system in the Ghana Health Service in some regions. Thus the Regional Medical Stores follow a laid down schedule to supply medicines requested by health facilities. In areas where the roads are not in good shape, breakdown of vehicles is common resulting in delayed delivery of medicines, thereby, affecting access of medicines to the final consumer. In such circumstances, the Just-in-Time method of logistics stocking, which has been found to be cost effective cannot be practiced. Health facilities therefore may over-stock due to uncertainties of the distribution system, denying other facilities of these essential medicines.

The introduction of newer vaccines has made it imperative for developing countries to map out strategies and plans to improve the logistics and supply chain system of vaccines, enshrined in the five priority objectives of the Vision 2020 Vaccine Supply

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and Logistics System (Zaffran *et al.*, 2013). Storage space for vaccines have become a challenge in most countries surveyed by Zaffran *et al* (2013). As indicated in Figure 3, Ghana required more storage space for its Expanded Programme on Immunization (EPI) in 2015 and for years beyond in the face of development of newer vaccines. Quality of vaccines may be adversely affected if proper storage conditions are not provided.

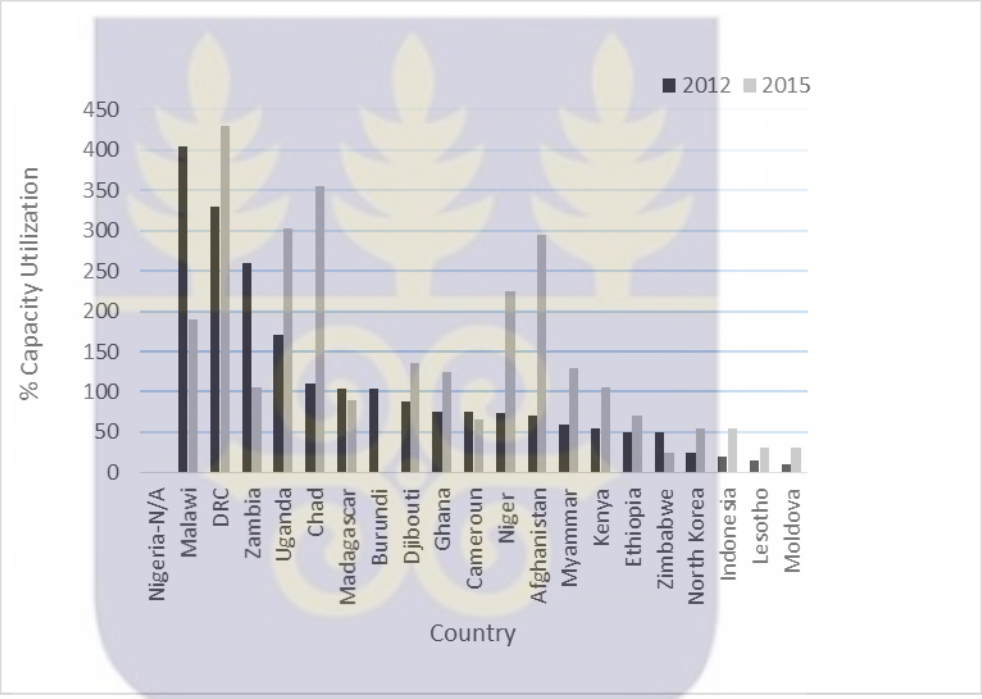

Figure 3: Percentage of national stores occupied by vaccines in 2012 and planned percentage of stores to be occupied by vaccines in 2015 for selected countries adopted from Zaffran *et al* (2013).

The increasing number of medicines and vaccines in health facilities require timely information needed to make decisions on forecasting, allocation of commodities and harmonizing distribution channels. The number of vaccines recommended by the World Health Organization has increased from 6 in 2000 to 12 in 2012 (Zaffran *et al.*, 2013). These new vaccines have been introduced to reduce mortalities and morbidities of pneumonia, diarrhoea, cancers and other diseases. To do this effectively, the use of

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modern information systems, computers and software tailored to this need and the internet is necessary. Some low-income countries have adopted a system where commodities are redistributed to facilities at other levels that have space. The use of cold boxes with long hold-over time can also get vaccines to remote areas where electricity is not available.

2.10 Governance and Leadership

The overall implementation of strategies of the efficiency of service delivery depends on the management structures in place to ensure proper planning, implementation of plans and effective monitoring and evaluation of planned activities. The core of the health system is the delivery of health services and exists in line with governance, leadership and interaction with the population and other actors (Van Olmen *et al.*, 2012). The component of the health systems dynamic framework has leadership and governance playing an overarching role. Governance describes the whole policy framework driving the health system, which involves coordination of functions, allocation of resources, regulation of actors and ensuring accountability to the population. Coordination of functions of various agencies within the system improves efficiency and effectiveness of health service delivery (Van Olmen *et al.*, 2012).

The oversight responsibility of leadership in monitoring and evaluating set goals and targets provides a driving force for achievement of set goals. It thus requires leaders to be accountable to the population. Accountability is situated at all levels of the health system between providers and patients, and the Ministry of Health, the government and the population. In Ghana, the National Development Planning Authority, in their 2015 report on the millennium development goals did not report on

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the goal 8E which states that in cooperation with pharmaceutical companies, countries should make essential medicines available to their people (UNDP, 2015). This omission may presuppose the government's disinterest in the subject matter of making essential medicines available to its people, as may be viewed by experts the subject area.

Policies to make medicines available have focused on improving efficiency of procurement and supply chain system, formulation and implementation of essential medicine lists, standard treatment guidelines and rational use of medicines, implementation of cost recovery mechanisms like the drug revolving fund and training of prescribers and dispensers as stand-alone programs. Most of the interventions have not linked availability of medicines to other components of the health system blocks like financing, human resource, information and service delivery. Issues related to pharmaceutical are mostly treated as a unit problem without considering the influence of other systems on the pharmaceutical sector, thus interventions are not sustainable and are frequently short-lived (Bigdeli *et al*., 2013)

The WHO framework for governance and leadership as shown in Figure 4, describes the need for interdepartmental approach with the leadership and governance components playing a central role in coordinating all these components of the building blocks.

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Figure 4: Framework for leadership and governance in health systems strengthening, WHO, 2007

The generation of the essential medicines list does not guarantee access to these medicines but the formulation of policies and provision of funds to make them available is also important (McManus, 2010). The WHO encourages countries and health facilities to generate essential medicine lists and update it regularly as a first step to ensuring availability of essential medicines (Gray *et al.*, 2015). The importance of ensuring availability of essential medicines to the achievement of the MDGs and the SDGs is seen in the policy and strategies outlined in these documents.

2.11 Essential Medicines Focus in Millennium Development Goals and Sustainable Development Goals

The Millennium Development Goals were developed by the United Nations (UN) to ensure that member countries work at achieving uniform targets to improve the quality of life of humanity. The 15-year duration of the MDG elapsed in 2015. To sustain and improve on the gains made, the Sustainable Development Goals, also known as Agenda 2030, has been agreed on with more specific targets for member

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countries. The MDGs have saved the lives of millions and improved the conditions of many more albeit setbacks in some areas (United Nations, 2015b). Major strides achieved under the health-related MDGs 4,5 and 6 including a decline by more than half in global under-five mortality rate from 90 to 43 deaths per 1000 live births between 1990 and 2015, a reduction in global maternal mortality ratio from 330 per 100000 live births in 2000 to 210 per 100000 livebirths in 2013 and over 6.2million malaria deaths have been averted primarily in children under years in sub-Saharan Africa between 2000 and 2015(United Nations, 2015b).

However, target 8e which requires that the UN in cooperation with pharmaceutical companies, provides access to affordable essential medicines in developing countries, could not be properly assessed due to limited data. Availability of generic essential medicines in the public health facilities was averagely 58% and 67% in the private sector (United Nations, 2015b). The recommendation is therefore that, there is a need for better monitoring of availability of essential medicines and their patient prices in developing countries.

Following the successes and setbacks of the MDGs, the SDGs have been agreed on and countries are gearing to maintain, sustain and improve on the MDGs (United Nations, 2015b). There are 17 goals with one specific goal on health, SDG 3 at ensuring healthy lives and promoting well-being for all at all ages. Specific targets related to essential medicines include

- Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all

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- Support the research and development of vaccines and medicines for the communicable and non-communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines in accordance with the Doha Declaration on the TRIPS agreement and public health, which affirms the right of developing countries to use the full provisions in the TRIPS agreement regarding flexibilities to protect public health and in particular, provide access to medicines for all (United Nations, 2015a)

All other targets also requires the availability of medicines indirectly to ensure their achievement. It must be noted that the specific essential medicine targets were not time bound compared to other targets (ICSU & ISSC, 2015)

2.12 Background to Service Provision by Level of Care

The system of healthcare delivery in Ghana can be classified as a three-tiered system made up primary, secondary and tertiary levels. In line with the concept of Primary Health Care (PHC) that refers to essential health care that is based on scientifically sound and socially acceptable methods and technologies which make universal health care accessible to all individuals in a community, health services must be made available at the community level to offer treatment for common diseases in a particular locality with the right technologies. Countries have segmented the health service delivery in order to contain healthcare expenditure (Delnoij, Van Merode, Paulus, & Groenewegen, 2000).

Ghana's health sector is pluralistic consisting of allopathic, traditional and alternative providers spread across the public and private sectors. The private sector accounts for

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about 55% of health service provision in Ghana employing about 19.5% of the health workforce (Alhassan *et al.*, 2013; Ministry of Health, 2013). The provision of health services is categorized based on the expertise of the available workforce, as well as availability of diagnostic and monitoring equipment. This includes the health facilities' capacity to manage adverse events associated with drug administration. The level of care is determined by the Health Facilities Regulatory Agency of the Ministry of Health through the application of standardized assessment tool. The segmentation also serves as a gatekeeper system to control cost of service delivery (Delnoij *et al.*, 2000; Stabile *et al.*, 2013).

Health Facilities are thus categorized into community-based health planning services zones, clinics, maternity homes, health centres, polyclinics, primary hospitals, secondary hospitals and tertiary hospitals. Others include over-the-counter medicine sellers (previously known as chemical sellers), pharmacies and diagnostic centres each with unique level of expertise. Tertiary hospitals have highly specialized workforce with sophisticated diagnostic and monitoring equipment and are at the pinnacle of the service delivery continuum with high overhead costs (Bigdeli *et al.*, 2013; Hime *et al.*, 2014)

2.13 Summary of the Chapter

Availability of essential medicines is a key component in achieving universal coverage that most countries strive for. The lack of availability in developing countries has many contributory factors such as availability of funding and pricing which differ from country to country. Wide variations have been observed from surveys conducted in different parts of the world and in-country in terms of availability and affordability. The study sought to find the availability and

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affordability situation of essential medicines in Sekondi-Takoradi metropolis that could corroborate the current body of knowledge that is available or otherwise.

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CHAPTER THREE

METHODS

3.0 Introduction

The chapter discusses the method and the procedures for collecting and analyzing data. The study relied on the World Health Organization and Health Action International's methodology for assessing essential medicines affordability, availability and prices.

The chapter also explained the procedure for selecting the health facilities, as well as, participants for key informants' interviews. The characteristics of the health facilities and key informants were also described in this chapter. Ethical considerations of the research was also explained in this chapter.

3.1 Study Design

This was a descriptive cross-sectional study. Review of records of essential medicines was done retrospectively from 2011 to 2015. Stores ledgers and medicine stock cards were reviewed for availability of up to 50 essential medicines depending on the level of care of 14 health facilities. Physical stock of up to 50 essential medicines depending on the level of care was also assessed across 14 health facilities from 31st May, 2016 to 6th June, 2016. Attendance registers for each of the 14 facilities were reviewed and monthly out-patient attendance from 2011 to 2015 recorded. Cashbooks were reviewed and monthly drug revenues recorded for the period between 2011 and 2015. Quantitative and qualitative methods were used to assess stock levels and to assess facility level factors that affected essential medicines availability. The qualitative method complemented the findings of the quantitative methods

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3.2 Study Location

The study was conducted in the Sekondi-Takoradi Metropolis which lies on $04^0$55'00"N and $01^0$46'00"W at 30 feet above sea level with a population of 559,548 and a land area of 191.7$km^{2.}$. It is one of the 22 districts of the Western Region. The metropolis houses the regional capital, Sekondi-Takoradi. The metropolis has been divided into four sub metropolitan areas; Sekondi, Takoradi, Essikadu/Ketan and Effia/Kwesimintim (Figure 5). About 96.1% of households are in the urban area and 3.9% in rural area (Ghana Statistical Service, 2014a). It is the hub for railway transport, with the harbor and an airport for domestic air travel also available and the recently discovered oil and gas industry.

There are 64 health facilities in the Sekondi-Takoradi Metropolis made up of public, quasi-government, mission and private clinics. The public sector is made up of 1 Regional hospital, 3 district hospitals, 1 health centre and 10 CHPS compounds. There are also 42 retail private pharmacies in the metropolis. There is one Regional medical stores that supplies the drug and non-drug consumable need to health facilities in the region.

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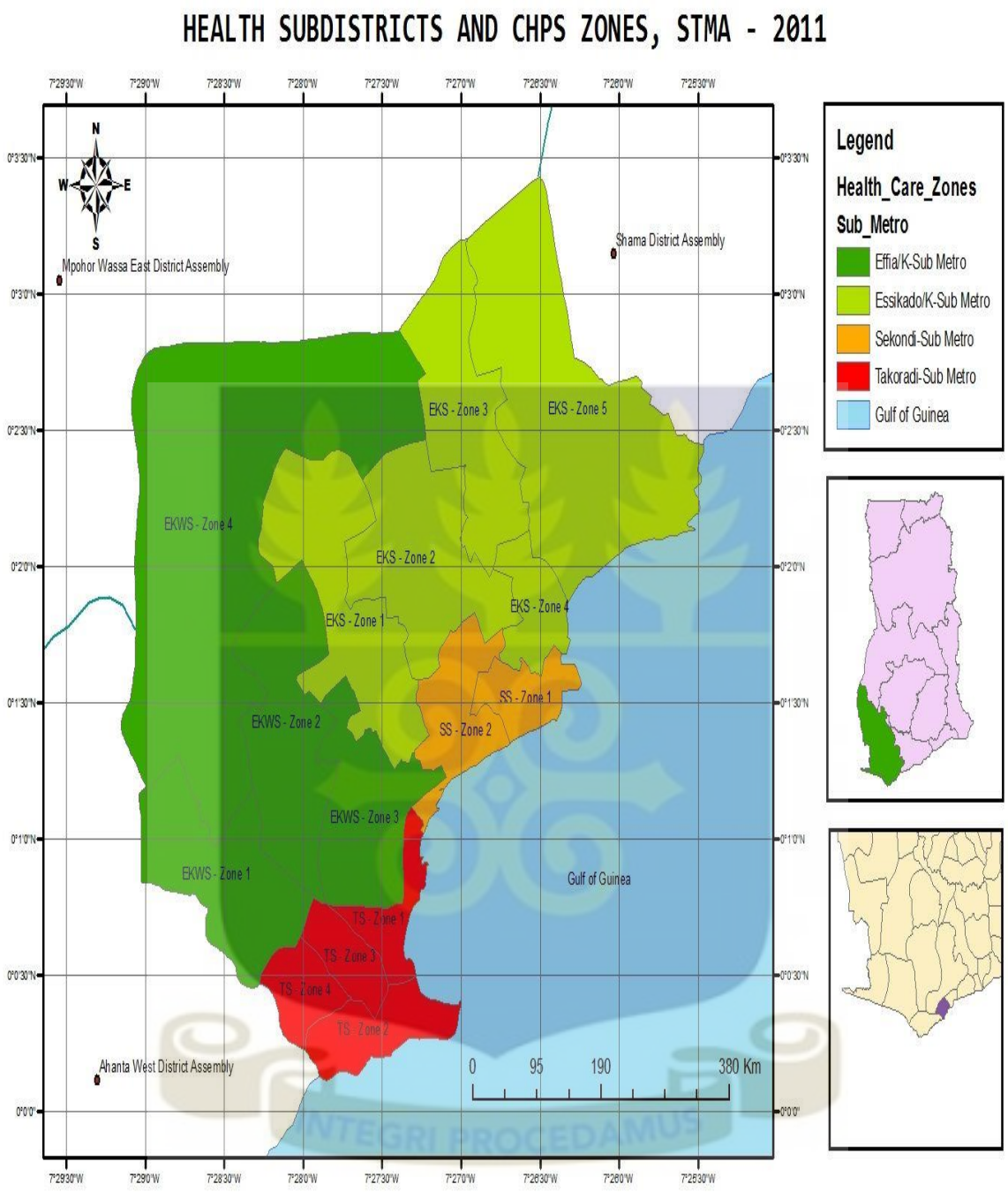

Figure 5: Map showing sub-metro demarcation of Sekondi-Takoradi Metropolis

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3.3 Variables

Table 2: Operational Definition of Variables

Variable	Operational Definition	Scale of Measurement
Availability of Essential Medicines available in Public Health Facilities	The number of essential medicines actually available at the specified time compared to the list of 50 sampled expressed as a percentage	Percentages
Affordability of Essential Medicines in Public Health Facilities	The number of days of wage the lowest paid government worker in Ghana will have to work in order to be able to pay for a standard treatment of an essential medicine	Days of wage
Price Ratio of Essential Medicines	Measure of the procurement price of essential medicines at the Regional Medical Stores	Ratio
Stock out days of antimalarials	Measure of the number of days in the year that antimalarial in the survey list were not available at the Regional Medical Stores	Days
Monthly Revenue on Medicines	The sum of the NHIS and Out-Pocket income/revenue of the health facility at the end of the month	Ghana Cedis

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Table 2 above describes the variables linked to the main and specific objectives of the study. The main variable of interest was the proportion of essential medicines at each health facility and the proportion of health facilities that had essential medicines available. The independent variables included levels of stock-outs, the price at which essential medicines were procured from suppliers and the affordability of the medicines to the patients based on the prevailing minimum wage.

3.4 Study Population

The study involved medicine outlets, and key informants who were directly involved in pharmaceutical services in the health facilities

3.4.1 Medicine Outlets

All public health facilities in the metropolis, including a Regional Hospital, 3 district hospitals, 1 health centre and 10 Community-based Health Planning Services (CHPS) compounds participated in the study. The Regional Medical Stores was assessed for availability of essential medicines.

3.4.2 Essential Medicine List

Fifty essential medicines were surveyed and they included essential medicines at the regional, district hospital, health centre and community-based health planning (CHPS) compound levels. These were medicines from the WHO Model Essential Medicine List 2010, Ghana Essential Medicine List 6th Edition, 2010 and Tracer Medicine List from the Western Regional Health Directorate (WRHD). Selected medicines had corresponding prices from the Management Sciences for Health (MSH) in the

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International Drug Price Indicator Guide, 2014. The essential medicines were made up of the following:

a. The WHO global core list of 13 essential medicines
b. The WHO regional core list of 13 essential medicines
c. The supplementary list of 24 essential medicines used in Ghana based on the selection criteria

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Table 3: List of 50 essential medicines surveyed

Medicine	Category	Medicine	Category
Aciclovir tablet	Regional core	Frusemide injection	Supplementary
Albendazole suspension	Supplementary	Frusemide tablet	Supplementary
Albendazole tablet	Regional core	Glibenclamide tablet	Global core
Amitriptyline tablet	Global core	Hydrocortisone injection	Supplementary
Amoxicillin capsule	Global core	Ibuprofen tablet	Supplementary
Anti-Rabies Vaccine injection	Supplementary	Losartan tablet	Supplementary
Artemether +Lumefantrine tablet	Regional core	Methyldopa tablet	Supplementary
Atenolol tablet	Global core	Metronidazole injection	Supplementary
Benzathine Benzyl Penicillin Injection	Regional core	Metronidazole tablet	Regional core
Benzyl Penicillin injection	Supplementary	Multivitamin tablet	Supplementary
Carbamazepine tablet	Regional core	Nifedipine tablet	Supplementary
Ceftriaxone Injection	Global core	Normal Saline infusion	Supplementary
Cefuroxime tablet	Supplementary	Omeprazole capsule	Global core
Chlorpheniramine tablet	Supplementary	Oral Rehydration Salts powder	Regional core
Ciprofloxacin tablet	Global core	Oxytocin injection	Supplementary
Clotrimazole pessary	Regional core	Paracetamol Syrup	Global core
Co-Trimoxazole Suspension	Global core	Paracetamol tablet	Supplementary
Co-Trimoxazole tablet	Regional core	Povidone Iodine solution	Supplementary
Dextrose infusion	Supplementary	Promethazine injection	Supplementary
Diazepam tablet	Global core	Quinine tablet	Supplementary
Diclofenac Suppository	Supplementary	Ringers Lactate infusion	Supplementary
Diclofenac tablet	Global core	Salbutamol Inhaler	Global core
Erythromycin tablet	Regional core	Simvastatin tablet	Global core
Ferrous Salt+ Folic Acid tablet	Regional core	Sulphadoxine+pyremethamine tablet	Regional core
Folic Acid tablet	Supplementary	Tetracycline Eye Ointment	Regional core

The combination of medicines was however based on the level of care of the facilities. Health Centers were surveyed on up to 32 essential medicines depending on whether there was a medical doctor or not due to the reduced scope of services rendered. CHPS compounds were also assessed on a further reduced list of 13 medicines based on the services they are expected to provide. Exclusion of medicines

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for each level was based on the level of use as classified in the Ghana Essential Medicine List, 2010.

3.4.3 Key Informant Interview

Eight managers in charge of pharmaceutical services from 8 public health facilities were interviewed, thus one manager was interviewed in each of the eight health facilities.

3.5 Sampling Method

The sample size was based on the Health Action International (HAI) methodology as described in section 2.7. The metropolis was zoned into four sub-districts. All 17 public facilities in the metropolis made up of the three public district hospitals, one health centre and thirteen CHPS compounds that were selected and all these facilities were within 3hour drive from the main public health facility (the regional hospital). As recommended by the WHO/HAI manual, health facilities within three-hour drive facilitated data collection visits and made data obtained from facilities more representative. Key informants were purposively selected at each health facility. The head of the pharmaceutical service department in each facility was selected for the interview.

3.5.1 Selection of Essential Medicines

Selection of the essential medicines was based on the World Health Organization and Health Action International (WHO/HAI) 2008 methodology described in section 2.7. It entailed selection of 14 medicines classified as Global Core Essential medicines, 16 classified as Africa Regional core essential medicines and another

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group called the supplementary list chosen from the national Essential Medicine List (EML) based on the prevailing disease burden making up 50 essential medicines. There was a second criterion for exclusion and substitution of some medicines on the list of 50 medicines selected by the principal investigator. All 50 medicines selected had a corresponding Management Science for Health (MSH) reference price and all medicines selected were on the Ghana Essential medicine list. Medicines on the Global and Regional Core Lists that were not available in the Ghana EML were replaced with alternatives from the Ghana EML, 2010. This was done to ensure that medicines in the particular therapeutic class that is available in the EML were represented (World Health Organization & Health Action International, 2008).

Essential medicines selected to make up the supplementary list for this survey was based on a list of 60 tracer medicines adapted from the Western Regional Health Directorate of the Ghana Health Service. These were medicines selected from the EML that the Regional health administration deemed necessary for treatment of disease conditions in the Western Region of Ghana. In selecting 20 medicines from the 60 tracer medicines, medicines on the tracer medicine list that appeared on the Global and Regional core list were excluded before the 20 medicines were randomly selected from the remaining tracer medicines on the list using the Random function of Microsoft Excel 2013 version. Four medicines were added to the supplementary list as recommended by the WHO/HAI 2008 manual described in section 2.7 to replace one medicine on the Global core list and three medicines on the regional core list.

In applying all the criteria outlined, four medicines were excluded from the Global and Regional core list because they were not listed on the Ghana EML, five medicines from the Ghana EML were excluded for unavailability of MSH reference prices and eight medicines that were on the Ghana EML 2010 appeared on the Global and

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Regional core list and so were excluded from the 60 tracer medicines list. One medicine in the Global core list (captopril 20mg) and three Regional core (Nystatin pessary, Chloroquine 150mg and Cephalexin tablet) were replaced with alternatives from the EML. These were, Captopril 20mg tablet replaced with an alternative Losartan 50mg tablet whiles Nystatin pessary 100.000IU, Chloroquine 150mg tablet and Cephalexin tablet 250mg replaced with Clotrimazole pessary 100mg, Quinine tablet 300mg and Cefuroxime tablet 250mg respectively. Thus, 13 Global core list of essential medicines, 13 Regional core and 24 supplementary medicines were selected for the survey as shown in Table 3.2 (Management Sciences for Health, 2014; Ministry of Health, 2010; World Health Organization & Health Action International, 2008; World Health Organization, 2015c).

3.5.2 Selection of Key Informants

One manager responsible for pharmaceutical services at each level of care was interviewed in the eight facilities surveyed for qualitative data. The manager in charge of pharmaceutical services at each health facility was purposively selected because the person in charge is assumed to have overall responsibility for selection and procurement of medicines for the health facility. One manager at the regional medical store, two managers from two district hospitals, one physician assistant from one health centre and two midwives and two community health nurses from four CHPS compounds were interviewed

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3.6 Data Collection Techniques

The World Health Organization/ Health Action International (WHO/HAI) 2008 methodology was adapted. The methodology states that selected medicines outlet will be given a unique code that will differentiate one facility from the other. The code was made up of 2 alphabets as prefix indicating the type of facility followed by 3 digit number representing the unique number assigned to the facility. The number of medicines for each level of care was applied accordingly. CHPS compounds were assessed on medicines at Level A as classified in the EML 2010. Health Centres were assessed on Level A, B1, B2 and PD. District Hospital were assessed on Levels A, B1, B2, C and PD. The Regional Hospital was assessed on Level A, B1, B2, C, D, SD and PD. The facilities were assessed for availability, price and affordability on 13,32, 43, 48 and 50 medicines respectively for level A, B1, B2, C and D. The Regional Medical Stores (RMS) was assessed on all 50 medicines on the list because it is the main supplier of medicines to all the health facilities.

Data on currently available essential medicines were collected by physically observing the availability of the unexpired essential medicines in 14 medicine outlets sampled for data collection by indicating whether the medicine was available or not. The brand name, packet size and unit price of the available essential medicine, either as the lowest-priced generic brand and the originator brand were recorded on the data collection sheet. The inventory control cards (Tally cards) and/or Stores Ledger for all medicines on the list were used to obtain availability for each month of the year beginning January, 2011 to December 2015 for the 5-year trend analysis.

Availability of the medicine on the last day of each month was assessed. Thus, a medicine was deemed available in the month if it was available on the last day of the month. The price of the originator brand and the lowest-priced generic of each of the

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medicines on the list available at the time of visit as they were sold to patients paying out-of-pocket was recorded. At the regional medical stores (RMS), the procurement prices of available medicines were recorded. These were recorded on the data compilation sheet recommended by WHO/HAI 2008. Collection of these data was completed in 7days upon commencement of data collection. Data were collected at less busy working hours of the 14 facilities.

The procurement register for public health facilities was also reviewed for forecasted yearly quantities of the selected essential medicines for 2011, 2012, 2013, 2014 and 2015. The revenue generated from medicines, both from the NHIS and Out-of-Pocket payment for each month for the last five years, 2011, 2012, 2013, 2014 and 2015 starting from January, 2011 was also recorded for each facility.

The number of stock-out days of antimalarials on the list was recorded for each month from 2011 to 2015 at all facilities.

The top ten diseases that were treated by each facility in 2013, 2014 and 2015 were reviewed and recorded

Key informants interviews were conducted with the heads of pharmacy departments in eight health facilities to corroborate findings of the quantitative data and provided reasons for stocking medicines. The manager in charge of the facility was interviewed in cases where there were no pharmacists employed in the facility. Themes for the interview with key informants included facility factors affecting availability of essential medicines, medicine price determination, procurement procedures and supply chain challenges. Questions for the interview were generated from the specific objectives set to be achieved by the study. Fourteen questions were generated from these objectives.

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3.7 Quality Control

Data collection was done by the researcher with the assistance of two research assistants with the requisite skills and knowledge of the area of the research. There was a 2-day training workshop to explain the objectives and methodology of the study to the research assistants to ensure each question was understood and interpreted well and consistent among all three interviewers. Data were collected within 7days to reduce the bias of facilities replenishing and/or depleting their stocks. A pilot test was done at a health center in the Shama District, a district close to the study location. Each medicine outlet was given a unique code to enable easy identification of facilities and prevent repeated data collection.

3.8 Pre-Testing

The checklist and data collection forms and key informant interview guide were tested at the health center in the Shama District.

3.9 Data Processing

Data collected were checked for consistency by the principal investigator on a daily basis. To minimize errors, the two research assistants entered the data independently. The double entry function of the pre-programmed WHO/HAI Medicines Availability and Affordability excel workbook was used to check for data errors and inconsistencies.

3.10 Data Analysis

Data were analyzed using the WHO/HAI Medicines Availability and Affordability workbook part 1 Version 1 released on 30th March 2011, a preprogrammed Microsoft

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Excel application and Microsoft Excel Version 2013. The two were used to enter the data and to summarize the results. The percentage availability of individual medicines across all health institutions was reported using the WHO/HAI workbook. The Summary Data function of the Public Sector data entry sheet of the workbook generated the mean percentage availability for originator brands and the lowest priced generic medicines available at the time of the survey across the 14 health facilities surveyed. The WHO/HAI workbook part 1 was used to calculate the percentage of facilities surveyed that had each specific essential medicine available at the time of the survey, as well as the mean availability in the study area.

It also generated the percentage of the surveyed medicines available at each facility. Microsoft Excel was used for the analysis of the five-year trends from 2011 to 2015 from which a graph of trend of medicines availability was generated. The WHO/HAI workbook part 1 was used to calculate the affordability of available medicines based on Management Science for Health's (MSH) 2014 price data report for the selected essential medicines. The affordability function calculated the number of days' wage the minimum wage earner works in order to procure a particular medicine. It was obtained by multiplying the unit median price of the medicine by the number of units required for a standard treatment regimen as indicated in the Ghana Standard Treatment Guidelines, 2010 and dividing the result by the prevailing daily minimum wage of GH¢8.00. The median price ratio (MPR) for each medicine available was also generated using the ratio function that compared the median price of each medicine obtained at the 14 health facilities with its corresponding median international reference price. The summary function generated the median of MPR, 25th percentile MPR and 75th percentile MPR. The total revenue for each month was calculated by adding out-of-pocket revenue to the NHIS revenue generated in each

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month and trend of total monthly medicines revenue from 2011 to 2015, was generated with the Microsoft Excel, 2013 version.

Stock-out days of selected antimalarials were also generated for the five-year trend analysis. This was obtained by adding the monthly stock out days for each medicine to obtain an average yearly stock out days within the 5 year period. The average yearly stock out days of each medicine within each level of care was computed and presented graphically.

Data on the yearly top 10 Out-Patient Department (OPD) morbidities from 2011 to 2015, was collected from each of the health facilities surveyed

In-depth interview data were analyzed using summarization and categorization of recorded responses under themes of perceptions of availability, price generation, procurement and supply chain challenges of essential medicines.

3.11 Ethical Considerations

Ethical clearance was sought from the Ghana Health Service Ethics Review Committee on Research Involving Human Subjects for the study. The consent of the Regional Director of Health Service, the Deputy Director of Pharmaceutical Services (Regional Pharmacist), the Metropolitan Director of Health Service and the managers of the sampled medicine outlets were sought. There were minimal ethical issues of the clients 'confidentiality since this study dealt with medicines in the health facilities and their managers. The data that were collected ensured the anonymity of facilities and respondents. There was no presumed conflict of interest of the researcher, even though the principal investigator is a staff of the Ghana Health Service.

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Risks of the Survey

There were no known risks associated with this survey to the respondents and data collected

Potential Benefits

Since a survey of this nature has not been conducted in the Sekondi Takoradi Metropolis, findings may provide information about current essential medicines availability and affordability of these medicines to patients of public health facilities where majority of the population seek medical care. The study may also inform the health care manager about the factors that affect availability of essential medicines in the metropolis and this is envisaged to help make decisions concerning essential medicines availability in the metropolis and region. There was no form of financial benefit to the respondent or researcher in this study

Protection of Confidentiality/Privacy

All data gathered in this study were protected. The identity of facilities and respondent were protected. All health facilities in the study were coded. Financial information recorded was only used for data analysis and reporting the findings of this study. All data sheets and recorders shall be under lock and key for up to one year after presentation of final report until they are destroyed.

Voluntary Participation

No participant was forced to partake in the study. All participants were allowed to read the conditions of the survey and appended their signature to the consent form before they were interviewed. It was envisaged that due to the benefits of this survey

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to healthcare managers all participants earmarked voluntarily joined the survey and they had the opportunity to withdraw at any point in the course of the survey.

Compensation

Participants of the study were not compensated financially for their time and energy spent on the study. Their contribution were however, acknowledged at the end of the survey.

Consenting Process

The consenting process entailed participants carefully reading through and understanding the terms of participation as outlined in the consent form. Any point for which a participant might not have understood was clarified before he or she appended his or her signature to the consent form as a sign of agreement to the terms of participation in the study.

Data Storage and Usage

Data obtained will be treated with the maximum possible protection. Each day's data sheet were kept by the principal investigator. The data obtained was kept under lock and key and this will continue for a period of one year after completion of the final report

Potential Conflict of Interest

The researcher is a staff of the Ghana Health Service. However, this did not affect processing, analysis and discussion of results of the finding in this research.

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3.12 Summary of the Chapter

The chapter had described the study location, Sekondi-Takoradi, as well as, the fourteen health facilities that participated in the study. The WHO/HAI 2008 methodology was fully described in relation to the study, including selection of the essential medicines, selection of health facilities and the procedure for analysis of the quantitative data collected using the WHO/HAI Workbook.

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CHAPTER FOUR

RESULTS

4.0 Introduction

This section presents the results and findings according to the objectives of the study. The results are reported in two main parts made up of the quantitative and qualitative sections. The two sections are reported by describing the characteristics of the study facilities and key informants. It is also presented along the objectives of essential medicines availability, affordability and the effectiveness of the procurement and supply chain system. Quantitative results are categorized according to the level of care described as community-based health planning services (CHPS) compounds, health centers without doctor, district hospitals, regional hospitals and medical stores

4.1 Quantitative Results

The quantitative results refer to findings from analysis of data gathered from records review. It provides the descriptive statistics needed to make meaningful conclusions such as mean percentage availability of essential medicines, median price ratios and affordability of essential medicines. Results of the efficiency and effectiveness of the procurement and supply chain systems in health facilities are also presented.

4.1.1 Background Characteristics of study Facilities and Medicine Outlets

A total of 14 public health facilities were surveyed. These facilities make up 82% of public health facilities in the metropolis. The facilities are made up of 1 regional hospital, 3 district hospitals, 1 health center and 8 CHPS compounds and 1 Medical Store from where medicines are procured and distributed to the health facilities in the region.

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Table 4: Background Characteristics of Survey Facilities

Type of Facility	Level according to Ghana's EML	Number of facilities surveyed	Number of Essential Medicines Surveyed
Regional Hospital	D	1	50
District Hospitals	C	3	48
Health Centres with Doctors	B2	0	43
Health Centres without Doctors	B1	1	32
Community-based Health Planning Services Compounds	A	8	13
Regional Medical Stores	N/A	1	50
Total		14	50

The number of medicines surveyed for each health facility is described according to the level of care. The highest number of medicines being 50 medicines at the regional hospital and regional medical stores levels and the lowest at the CHPS compound level with 13 medicines (Table 4).

4.1.2 Top Ten Out Patients Department (OPD) Morbidities

The trend of diseases presented at health facilities in the metropolis showed a reducing trend of malaria from 37.5% in 2013 to 27.8% in 2015, even though malaria continued to be the disease that was mostly reported in the metropolis (Table 5). Upper Respiratory Tract infections and Diarrhoea remained the second and third most reported diseases respectively from 2013 to 2015. Reports of skin diseases declined compared to other diseases as seen in the shift from the fourth most reported in 2013 to fifth most reported in 2014 to sixth most reported in 2015. Rheumatic and joint disorders over the period increased by 1.2% (Table 4.2). Acute urinary tract infections

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increased from 3% in 2013 to 4% in 2014 and declined marginally in 2015 while hypertension levels declined to the 10th most reported disease in the metropolis. Eye infections were not reported among the top 10 diseases in 2015. The levels of anaemia also remained high over the three-year period. The therapeutic class of medicines in the list surveyed cut across the diseases prevailing in the metropolis.

Table 5: Top Ten Out Patients Department (OPD) Morbidities

Position	OPD cases in 2013		OPD cases in 2014		OPD cases in 2015	
	Disease Condition	%	Disease Condition	%	Disease Condition	%
1	Malaria	37.5	Malaria	33.8	Malaria	27.8
2	Upper Respiratory Tract Infection	11.1	Upper Respiratory Tract Infections	14	Upper Respiratory Tract Infections	15.0
3	Diarrhoea	5	Diarrhoea	6.6	Diarrhoea	5.9
4	Skin Disease	4.4	Rheumatism & Other Joint Pains	5.4	Rheumatism & Other Joint Pains	5.5
5	Rheumatism & Other Join Pains	4.3	Skin Diseases	4.8	Intestinal Worms	4.4
6	Intestinal worm	3.4	Intestinal Worms	4.4	Skin Diseases	4.0
7	Anaemia	3	Anaemia	4	Anaemia	3.8
8	Acute Eye Infection	1.5	Acute Urinary Tract Infection	2	Acute Urinary Tract Infection	1.8
9	Hypertension	1.4	Acute Eye Infection	1.6	Typhoid Fever	1.5
10	Acute Urinary Tract Infection	1.3	Hypertension	1.5	Hypertension	1.4
	All Others	27.2	All other Disease	21.8	All Other Diseases	28.8
	Total	100.0	Total	100.0	Total	100.0

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4.1.3 Geographical Distribution of Surveyed Essential Medicines

A total of 50 medicines were selected for the survey based on the criteria of medicine in the WHO essential medicine list, the 2010 Ghana Essential Medicine List and availability of MSH 2014 reference buyer price. The distribution of medicines across the three categories is shown in the Figure 6 below. The Global core list of medicines made up 26% of the total number of medicines surveyed. The Regional core list of medicines for the Africa region was also 26% (13 medicines) while the supplementary list specific to Ghana and the Western Region constituted 48% (24 medicines) of the 50 medicines surveyed.

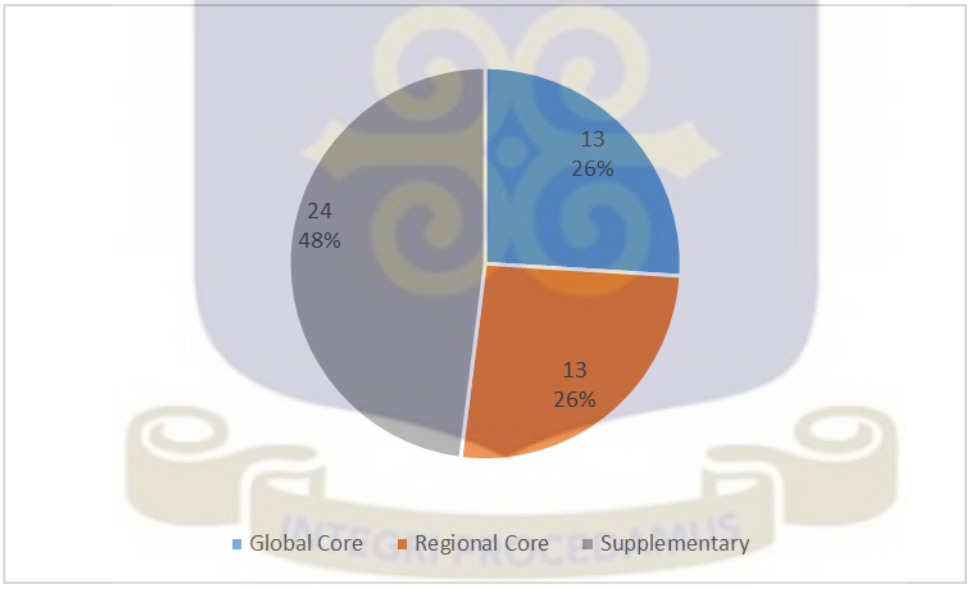

Figure 6: Geographical Distribution of Surveyed essential medicines

4.1.4 Availability of Essential Medicines

The results of essential medicines availability are presented in two parts comprising availability of physically observed unexpired medicines observed between 31st May and 6th June, 2016 and availability as captured from stores ledgers and stock control

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cards from 2011 to 2015 presented as the trend of availability over the five-year period. Between 31st May and 6th June, 2016. The mean availability of essential medicines was 64.5% of the lowest-priced generic versions of medicines which were available across public health facilities in the metropolis with standard deviation of 34.4% across the 14 health facilities while mean availability for originator brands stood at 0.3% and this was only found at the regional hospital level. Thirteen public health facilities out of 14 surveyed did not stock any originator brands (Table 6)

Table 6: Availability of Essential Medicines

Indicator	Level of care					All
	CHPS compounds	Health Centres without doctor	District Hospitals	Regional Hospitals	Medical Stores	
Number of facilities surveyed	8	1	3	1	1	14
Number of Essential Medicines Surveyed	13	32	48	50	50	50
Mean Availability of essential medicines across facilities for Lowest Priced Generic Brand (SD)	42.90% (±34.60)	66.70% (±47.10%)	63.90% (±40.60%)	78% (±41.80%)	62.00% (±49.00%)	64.50% (±34.40%)
Mean Availability of essential medicines across facilities (Originator Brand)	0%	0%	0%	4%	0%	0.3% (±1.40%)

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4.1.5 Sub-metro availability and price ratios

Availability of essential medicines across the four sub-metropolitan areas was highest in the Sekondi Sub-metro area at 74.4%(standard deviation 40.2%) where the regional hospital is located and Kwesimintim had the lowest at 59.9% (standard deviation 46.3%) where one of the three district hospitals and three CHPS compounds were located (Table 7).

Table 7: Sub-metro availability and price ratios

Sub-Metro	Number of Facilities Surveyed	Mean Essential Medicines Availability (SD)
Essikado	4	63.5(±44.6)
Kwesimintim	4	59.9(±46.3)
Sekondi	3	74.7(±40.2)
Takoradi	3*	62.5(±44.4)

*includes medical stores

4.1.6 Availability of Essential Medicines across 14 Health Facilities

A total of 17 essential medicines were available across all 14 facilities and these were made up of 3 antibiotics, 2 antihypertensive, 2 antihistamines, 1 each of antimalarial, antifungal, antidiabetic, analgesic, hypnotic, antiulcer, and vitamins and minerals. Antidiarrhoeal medicine, Oral Rehydration Salts (ORS) was found in 84.6% of health facilities, similar to Albendazole used to treat worm infestation (Table 8).

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Table 8: Availability of Essential Medicines across 14 Health Facilities

Medicine	Percentage of Facilities with Medicine	Medicine	Percentage of Facilities with Medicine
Amoxicillin	100	Ringers lactate infusion	80
Artemether+lumefantrine	100	Multivitamin	76.9
Atenolol	100	Quinine	75
Carbamazepine	100	Metronidazole injection	75
Ceftriaxone injection	100	Albendazole suspension	69.2
Cefuroxime	100	Oxytocin injection	60
Clotrimazole pessary	100	Benzyl penicillin injection	50
Diazepam	100	Co-trimoxazole suspension	50
Diclofenac	100	Dextrose Infusion	50
Folic Acid	100	Furosemide injection	50
Glibenclamide	100	Methyldopa	50
Hydrocortisone injection	100	Chlorpheniramine	46.2
Ibuprofen	100	Diclofenac suppository	38.5
Nifedipine	100	Sulphadoxine+ pyrimethamine	30.8
Omeprazole	100	Amitriptyline	25
Promethazine injection	100	Furosemide	25
Sodium chloride infusion	100	Losartan	25
Paracetamol syrup	92.3	Ferrous salt+folic acid	15.4
Paracetamol	92.3	Povidone iodine solution	7.7
Albendazole	84.6	Tetracycline eye ointment	0
Oral rehydration salts	84.6	Aciclovir	0
Ciprofloxacin	80	Anti Rabies Vaccine	0
Co-trimoxazole	80	Salbutamol inhaler	0
Erythromycin	80	Simvastatin	0
Metronidazole	80	Benzathine benzyl penicillin injection	0

Six essential medicines were not found in any of the 14 facilities surveyed and these included one programme drug (Benzathine Benzyl Penicillin injection). Anti-Rabies Vaccine and Salbutamol inhaler were also not available in all 14 facilities surveyed. Sulphadoxime pyrimethamine tablet, another program drug for prophylaxis of malaria in pregnant women was available 4 health facilities representing 30.8% of facilities (Table 8).

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4.1.7 Trends of Mean Yearly Essential Medicines Availability from 2011 to 2015

The regional hospital recorded mean availability of 70.16% representing 35 essential medicines in 2011, 78.17% (39 medicines) in 2012, a decline to 73% (36medicines) in 2013, and a further decline to 70.3% (35 medicines) in 2014 and 70.8% (35 medicines) in 2015. A similar declining trend was observed in the district hospitals, health centers and the regional medical stores (Figure 7). The trends of medicines availability at the CHPS compound level was however seen to be increasing from 11.2% (1 medicine) in 2011 to 23.4% (3 medicines) in 2015, even though the CHPS compound level recorded the lowest mean essential medicines availability (Figure 7)

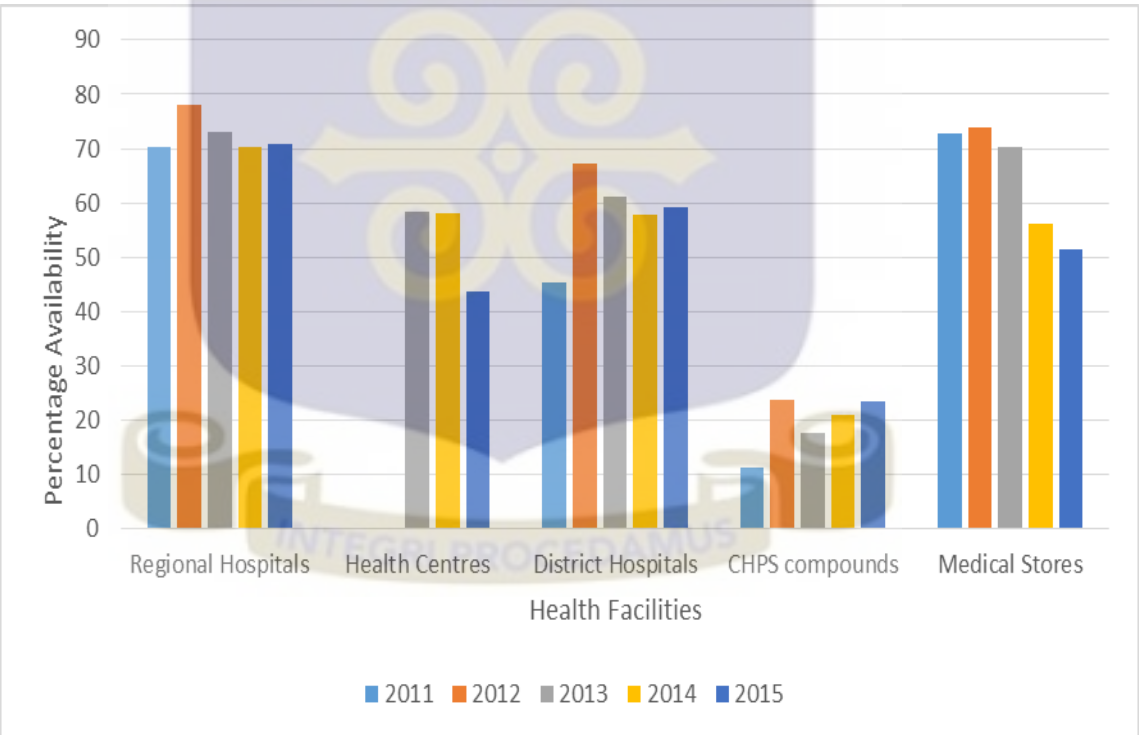

Figure 7: Trends of Mean Yearly Essential Medicines Availability from 2011 to 2015

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4.1.8 Trends of Essential Medicine Availability (2011 to 2015) at CHPS compounds

The trend of medicine availability at the CHPS level over the five-year period was averagely unchanged as observed with the linear trend line. In 2013 availability was as low as 17.3% (Figure 8). There was 8.3% increase in 2014 to 25.5% and a subsequent decline to 22.4% in 2015. (Figure 8)

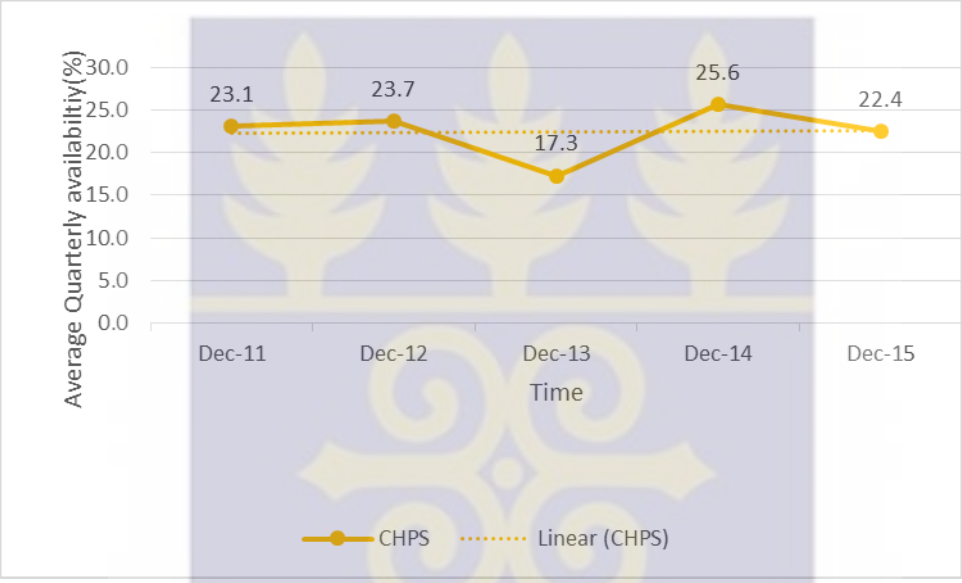

Figure 8: Trends of Essential Medicine Availability (2011 to 2015) at CHPS compounds

4.1.9 Trends of Essential Medicine Availability from 2011 to 2015 at Health Centres

Trends at the health centre level revealed a decline in availability of essential medicines from 54.8% in 2013 to 38.7% in 2015 (Figure 9).

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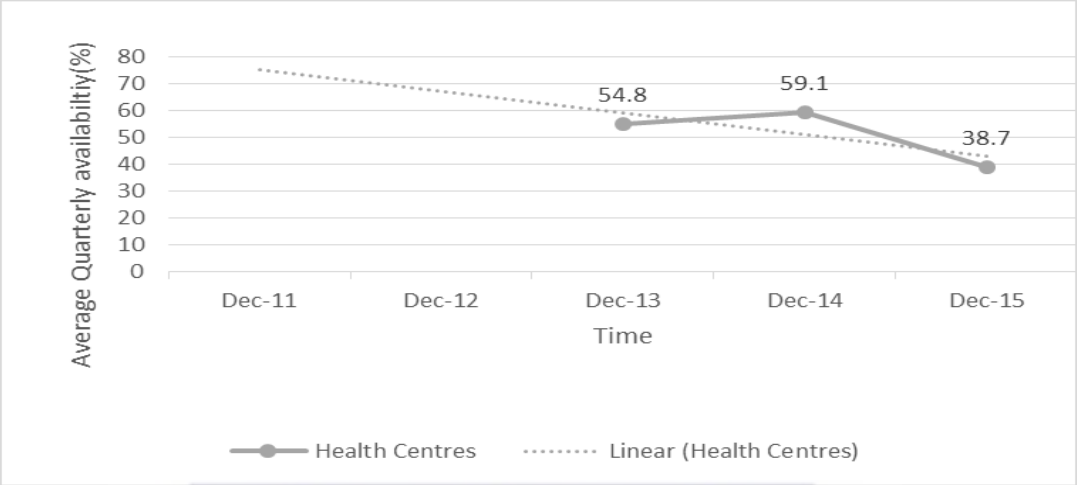

Figure 9: Trends of Essential Medicine Availability from 2011 to 2015 at Health Centres

4.1.10 Trends of Essential Medicine Availability from 2011 to 2015 at District Hospitals

District hospitals recorded an average increasing trend of essential medicine availability from 45.1% in 2011 to 62.0% in 2015. However, between 2013 and 2015 recorded a downward trend from 65.7% to 62.0% (Figure 10).

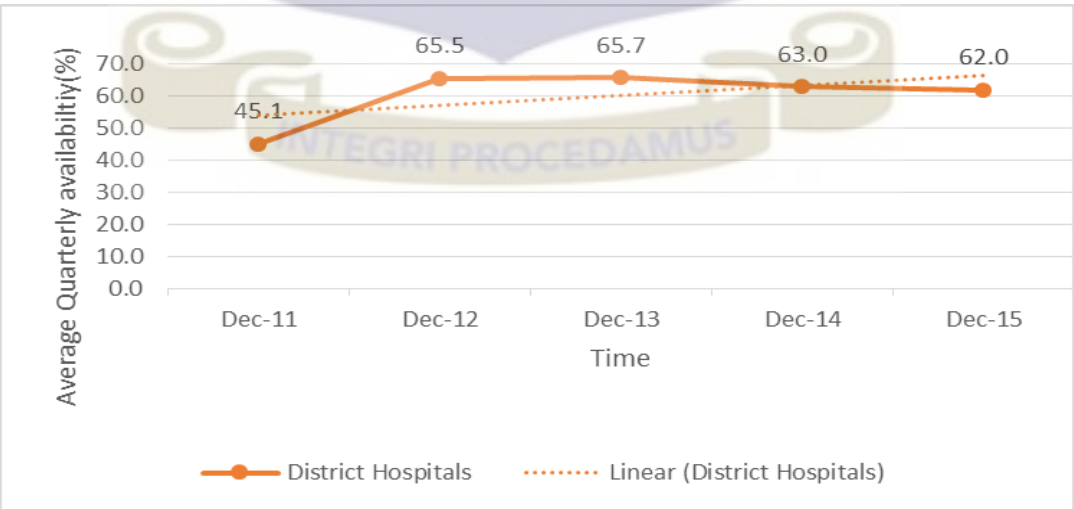

Figure 10: Trends of Essential Medicine Availability from 2011 to 2015 at District Hospitals

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4.1.11 Trends of Essential Medicine Availability from 2011 to 2015 at Regional Hospitals

A rising trend of essential medicine availability was observed from 2011 to 2013. Availability was 72.7 in 2011 and increased by less than 1% to 73.3% in 2012 and reached the highest level of 78% in 2013. In 2014 there was sharp decline in availability to 65.3% in 2014 and rose again to 72.7 in 2015. The regional hospital remained the facility with an averagely high availability of essential medicines at about 72.4% (Figure 11)

Figure 11: Trends of Essential Medicine Availability from 2011 to 2015 at Regional Hospitals

4.1.12 Trends of Essential Medicine Availability from 2011 to 2015 at Regional Medical Stores

The regional medical stores had recorded a decreasing trend in essential medicine availability from 2011 to 2015. In 2011, availability was 78.7% and consistently declined to 73.3% from 2012 to 2015 with a little increase of 4% over the 2014

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proportion. Availability of essential medicines was lowest in 2014 at 53.3% throughout the period. In 2015, however, there was an increase of 4% to 57.3% (Figure 12)

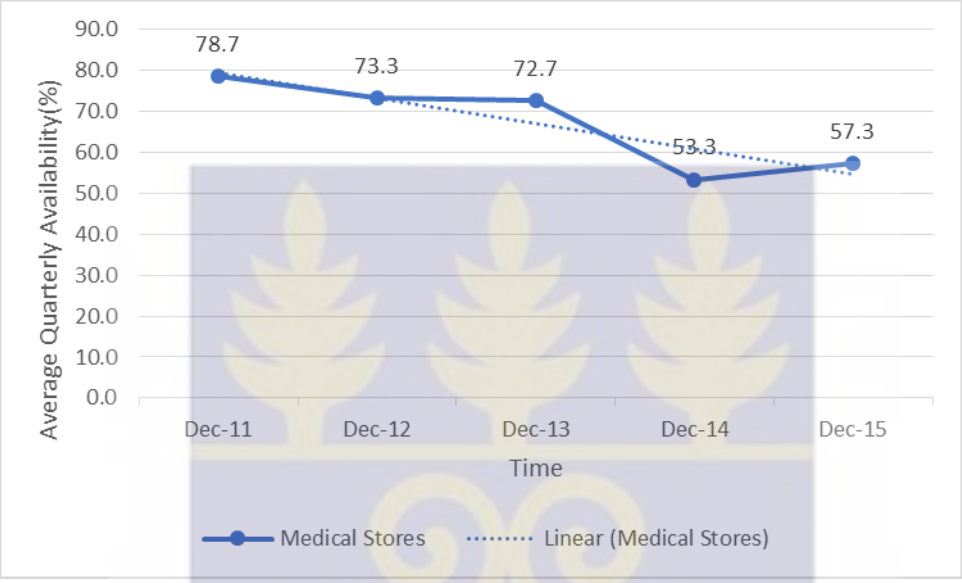

Figure 12: Trends of Essential Medicine Availability from 2011 to 2015 at Regional Medical Stores

4.1.13 Five-year Trends in Drug Revenue at CHPS Compounds

Revenue data collected from the health facilities in the metropolis generally increased across health facilities, except the CHPS compound level which saw a decline in revenue over the five-year period

Medicine revenue for the CHPS level of care generally rose in 2013 and has since been declining. There was 117% increase in revenue from 2012 to 2013 from GH¢2,662.44 to GH¢5,778.99. Revenues, however declined by 24.5% from GH¢5,778.99 to GH¢4,361.23 in 2014 and further decrease by 44% in 2015 (Figure 13)

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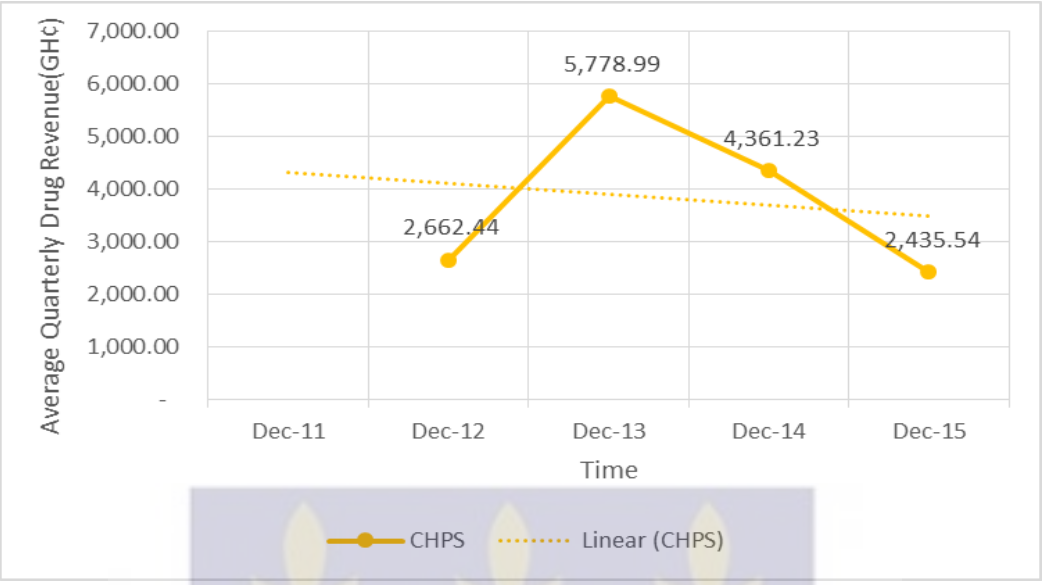

Figure 13: Five-year Trends in Drug Revenue at CHPS Compounds

4.1.14 Five-Year Trends in Drug Revenue at Health Centre

The health centre recorded an upward trend in quarterly revenues from 2011 to 2015. Apart from a reduction in revenue of about 28.7% from 2011 to 2012, there was a steady rise in revenue in 2013, 2014 and 2015 at increasing rates of 11%, 128.6% and 117% respectively (Figure 14)

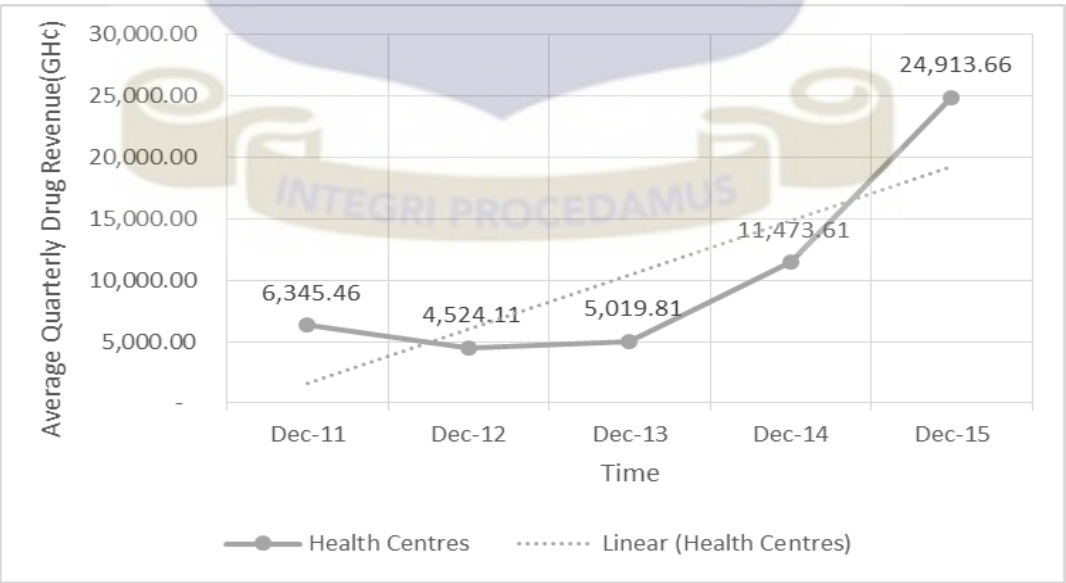

Figure 14: Five-Year Trends in Drug Revenue at Health Centre

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4.1.15 Five-year Trends in Drug Revenue at District Hospitals

There was also a steady rise in drug revenues at the district hospital level. There was an initial decrease in revenue from GH¢180,164.95 in 2011 to GH¢174,420.44 2012 representing about 3% reduction in revenue. Revenue then increased by 10.4% in 2013 to 11.2% (GH¢227,557.43) in 2015 (Figure 15).

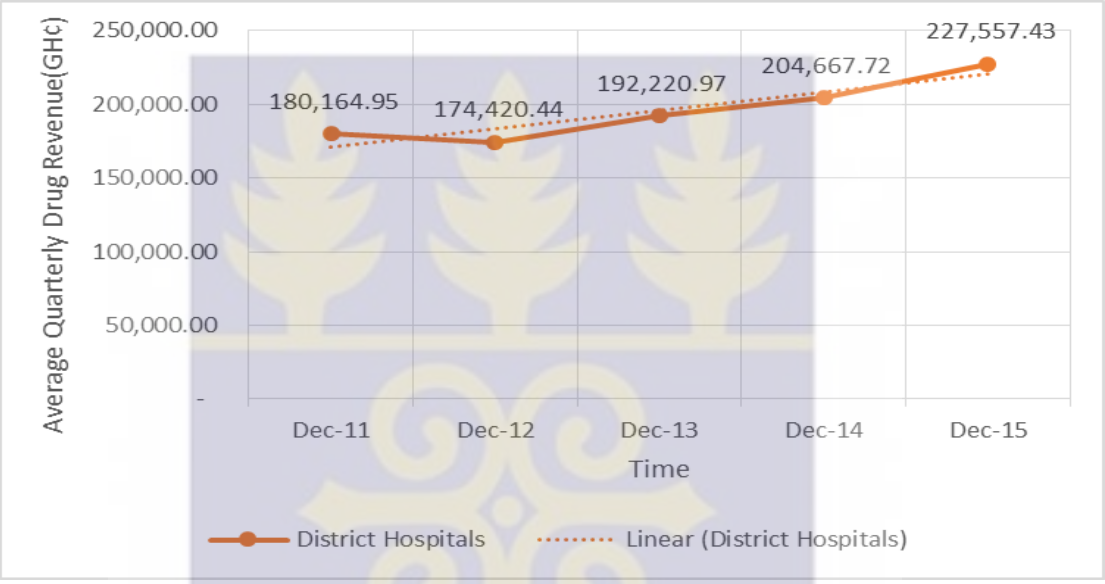

Figure 15: Five-year Trends in Drug Revenue at District Hospitals

4.1.16 Five-year Trends in Drug Revenue at Regional Hospital

The regional hospital recorded a general increase in revenue over the five-year period. Sharp increases of 114 %(GH¢120,538.86) in 2013and 182 %(GH¢397899.95) were recorded, whiles declines of 60.8 %(GH¢164,084.52) and 3.6% (GH¢8,056.59) were observed in 2012 and 2014 respectively from the previous year (Figure 16). Revenues at the regional hospital remained highest compared to the district hospitals, health centres and CHPS compounds.

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Figure 16: Five-year Trends in Drug Revenue at Regional Hospital

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4.1.17 Five-Year Trends in Out-Patient Attendance at CHPS compounds

Community-based health planning services (CHPS) compounds recorded a steady decline in attendance over the five-year period. The linear curve shows a gentle slope. There was an intermittent rise and fall in attendance. While there was an increase of 58% in 2012 a decrease of 70% was observed in 2013. Subsequently, there was a 77% increase in 2014 from 2013 and then a 32% decrease in 2015 from 2014 (Figure 17).

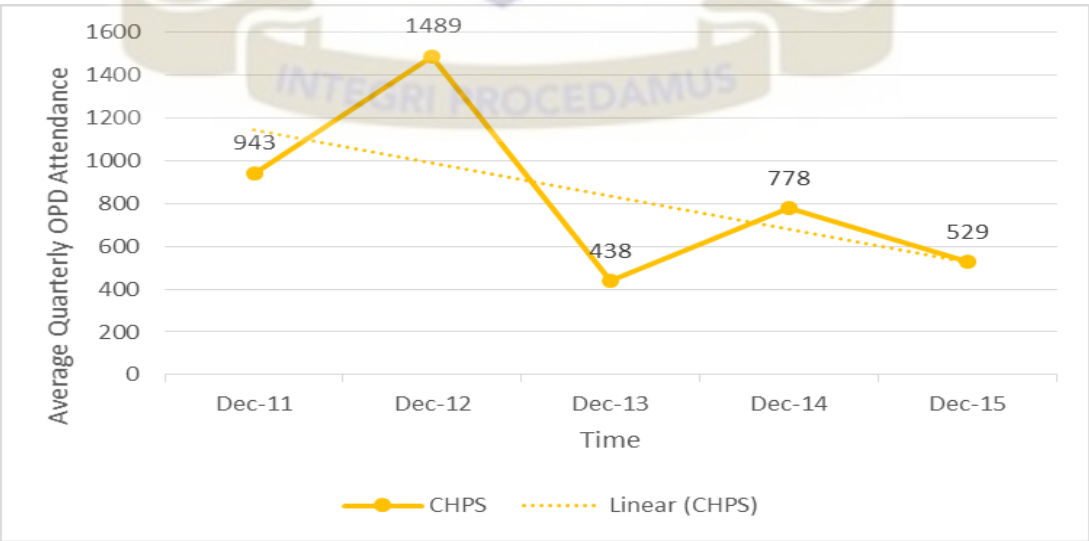

Figure 17: Five-Year Trends in Out-Patient Attendance at CHPS compounds

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It appears as medicines availability declined in the CHPS compounds, revenue from drugs and out-patient attendances also declined over the five-year period. It is however unclear as to whether it is the decline in medicines that affected attendance and then that affected the revenue from drugs as revenues from drugs are closely linked to patient attendance.

4.1.18 Five-Year Trends in Out-Patient Attendance at Health Centres

There was an intermittent rise of 15% increase in 2012 and then a decrease in 2013 and a further 17% decrease in attendance was recorded in 2014. In 2015 an increase in attendance of about 50% was also recorded (Figure 18).

Essential medicines availability declined over the five-year period even though drug revenue increased over the same period.

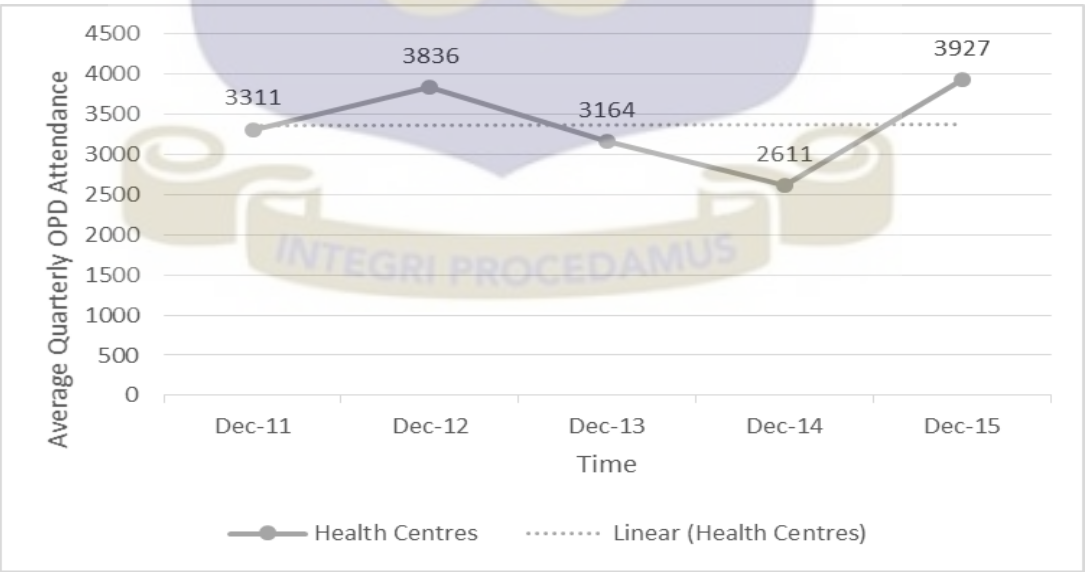

Figure 18: Five-Year Trends in Out-Patient Attendance at Health Centres

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4.1.19 Five-Year Trends in Out-Patient Attendance at District Hospitals

A gentle decline in the average quarterly attendance at district hospitals was observed. A 6% (1053) increase in attendance was observed in 2012. Subsequently, attendance decreased throughout the three-year period from 2013 to 2015 (Figure 19).

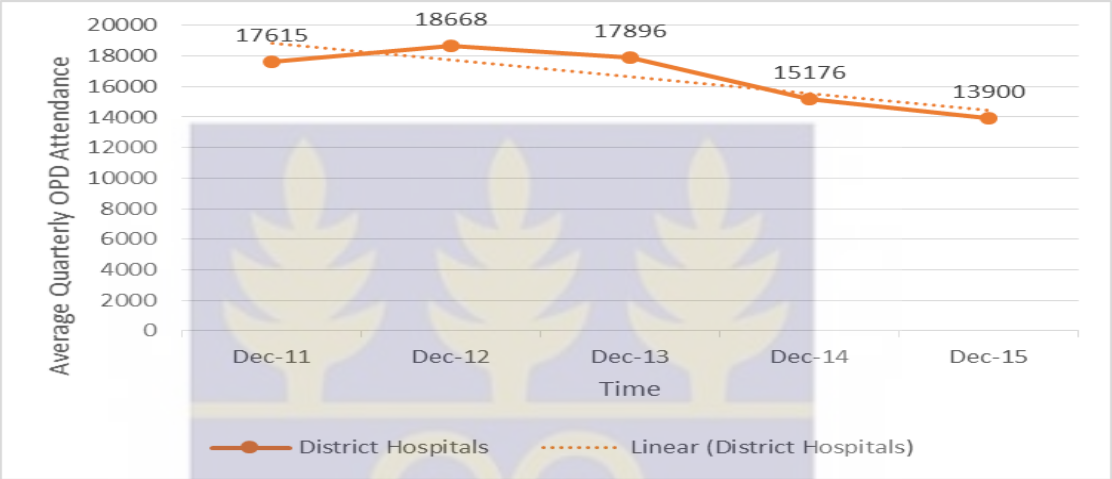

Figure 19: Five-Year Trends in Out-Patient Attendance at District Hospitals

4.1.20 Five-Year Trends in Out-Patient Attendance at Regional Hospital

The regional hospital recorded erratic quarterly attendance from 2011 to 2015 as described in Figure 20. There was a 6% increase in OPD attendance to 26413 in 2012. 2013 recorded a 7% decrease in patient number while 2014 recorded 10.8% increase in attendance. In 2015 there was a marginal 2% decrease in quarterly out-patient attendance.

At the regional hospital, essential medicines availability declined even though revenues and OPD attendance increased.

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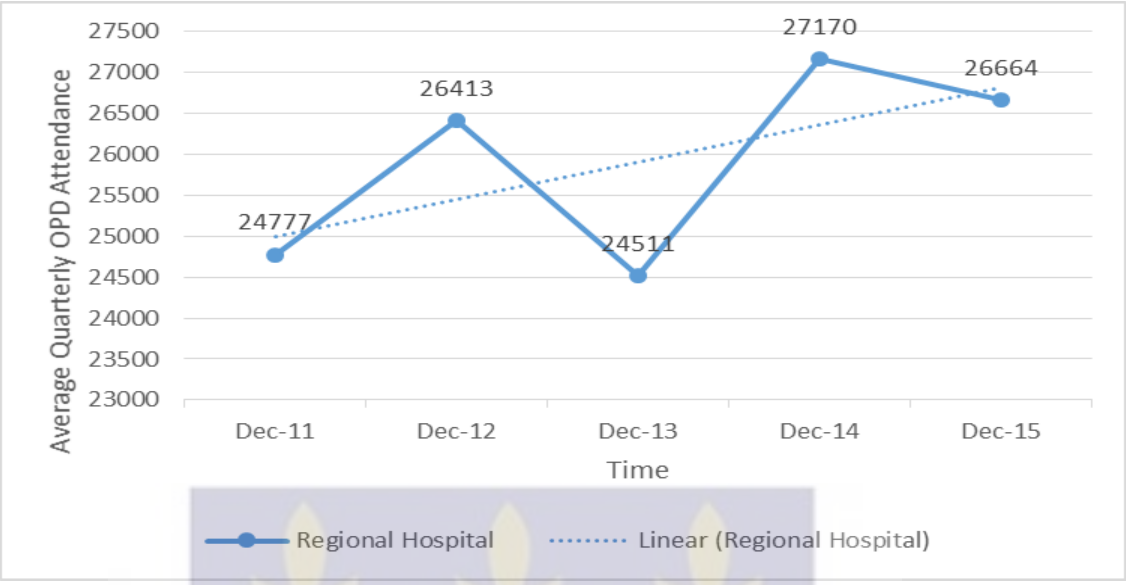

Figure 20: Five-Year Trends in Out-Patient Attendance at Regional Hospital

4.1.21 Affordability of Essential Medicines

The median of MPR in the Sekondi-Takoradi Metropolis at the time of this survey in public facilities was 2.03. Fifty percent of the price ratios however fell within the range of 1.43 and 3.17 (Table 9).

Table 9: Affordability of Essential Medicines

Indicator	Level of care					All
	CHPS Compounds	Health Centres without doctor	District Hospitals	Regional Hospitals	Medical Stores*	
Median MPR	1.88	1.53	1.93	2.06	1.04	2.03
25th Percentile MPR	1.51	1.15	1.35	1.44	0.54	1.43
75th Percentile MPR	7.97	2.27	2.33	3.10	1.39	3.17
Minimum MPR	0.26	0.31	0.27	0.26	0.13	0.27
Maximum MPR	15.26	20.99	15.83	15.83	8.17	18.47

*Recorded as Median Procurement-Price Ratios

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4.1.22 Sub-metro Price Ratio of Essential Medicines

The median price ratio of essential medicines was highest at 2.23 in the Takoradi Sub-metro above the metropolitan median of 2.03 followed by Sekondi with 2.06 (Table 10). This means that patients paying out-of-pocket for medicines, pay more than twice the international median patient buying price for essential medicines. An assessment of the procurement prices of medicines at the regional medical stores shows a median MPR of 1.04, 25th percentile MPR of 0.54 and 75th Percentile of 1.39. This is interpreted as a local purchase price of medicines by the medical stores is 1.04 times the international patient buyer price as indicated by MSH in 2014 and 50% of procurement prices of essential medicines at the regional medical stores fell in the ratio of 0.54 and 1.39 (Table 9).

Table 10: Sub-metro Price Ratio of Essential Medicines

Sub-Metro	Number of Facilities Surveyed	Median Price Ratio
Essikado	4	1.73
Kwesimintim	4	1.73
Sekondi	3	2.06
Takoradi	2*	2.23

*Excludes the medical stores

4.1.23 Affordability of Selected Essential Medicines

The daily minimum wage as announced by the Government of Ghana for the year 2016 was GH¢8.00(Government of Ghana, 2016). The forex rate for the United States Dollar was 3.8416 Cedis to a Dollar on 31st May, 2016(Bank of Ghana, 2016). Thus the Dollar equivalent of the daily minimum wage is $2.08

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Treatment for the most common disease patients report with at health facilities, such as uncomplicated malaria, required 0.4 day's wage (GH¢3.20) of the lowest paid unskilled government worker for a three-day treatment course of the first line antimalarial recommended by Ghana's Standard Treatment Guideline, 2010. Uncomplicated malaria in a pregnant woman will require 1.8days' wage (GH¢14.40) for a seven-day course of treatment, about four and half times that in the individual who is not pregnant. Table 11 shows that for some diseases there were options from which prescribers could choose from depending on the specific signs and symptoms, as well as, patient tolerability factors. In the treatment for acute respiratory tract infections, a 7-day course of amoxicillin in an adult will require 0.6days' wage (GH¢4.80), whiles the alternative for patients who cannot tolerate amoxicillin will require erythromycin that demands 1.5days' wage (GH¢12.00). Cefuroxime that has a reduced frequency of oral administration will require 2.8days' wage (GH¢22.40) for a 7-day standard course of treatment. The numbers of days the lowest paid unskilled government worker will work in order to pay out-of-pocket for the other most occurring diseases in the metropolis are shown in Table 11.

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Table 11: Affordability of Selected Essential Medicines

Disease	Medicine for treatment according to STG 2010	Duration of Treatment	Cost of standard treatment with medicine (GH¢)	Minimum Number of Days of minimum wage required to pay for Medicine
Uncomplicated Malaria	Artemether Lumefantrine tablet 20mg/120mg Adult full course	3 days	3.20	0.4
Uncomplicated Malaria in Pregnancy	Quinine Sulphate tablet 300mg	7days	14.40	1.8
Acute Respiratory Tract Infection	Amoxicillin capsules 500mg	7days	4.80	0.6
	Cefuroxime 250mg	7days	22.40	2.8
	Erythromycin 250mg	7days	12.00	1.5
Urinary Tract Infection	Ciprofloxacin 500mg	7days	5.60	0.7
Hypertension*	Atenolol tablet 50mg	30days	6.40	0.8
	Losartan tablet 50mg	30days	24.00	3.0
	Nifedipine sustained release tablet 20mg	30days	5.60	0.7
Pregnancy Induced Hypertension	Methyldopa tablet 250mg	30days	20.80	2.6
Diarrhoeal Disease	Oral Rehydration Salts WHO formulation	3days	2.40	0.3
	Ringers Lactate Infusion 500ml	3days	16.00	2.0
Gastric/Duodenal Ulcer	Omeprazole capsule 20mg	28days	16.80	2.1
Anaemia	Ferrous Sulphate + Folic Acid tablet	14days	6.40	0.8.
Rheumatism and other joint pains	Paracetamol tablet 500mg	5days	1.60	0.2
	Diclofenac tablet 50mg	5days	3.20	0.4
Worm infestation	Albendazole 400mg	1day	2.40	0.3

*Treatment may continue for the rest of the patient's life

4.1.24 Stock out days of selected Antimalarials

Figure 21 shows the average number of days in each year for which selected antimalarials were not available in the stores of the various facilities. The antimalarials assessed included Artemether Lumefantrine 20mg/120mg tablet adult regimen (AL), Quinine Sulphate 300mg tablet (QN) and Sulphadoxime

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Pyrimethamine tablet (SP). At the Medical Stores AL was not available for 128days per year from 2011 to 2015. At the regional hospitals, however, AL was mostly available, with stock outs recorded for an average of 5 days annually throughout the five-year period.

The highest duration of stock out for AL was 196 days per year recorded at the CHPS compound level. The CHPS level also recorded high stock out days compared to regional hospital, district hospital and health centre levels of care for AL and SP. QN was not assessed at the CHPS compound level because it is below the medicine's recommended level of use. QN recorded generally high stock out days across the levels of care compared to AL, recording a minimum of 52 days annually at the regional hospital, 192 days at the district hospital and 200 days annually at the health centre. SP showed very high stock out days across all levels with the CHPS level recording a 5-year stock out period. The health centre, district hospital and regional hospital recorded 64, 146 and 166 day average annual stock out respectively for the five-year period .The regional medical stores, which is the only source of distribution of program drugs, recorded an average of 329 days stock out yearly of SP between 2011 and 2015 (Figure 21).

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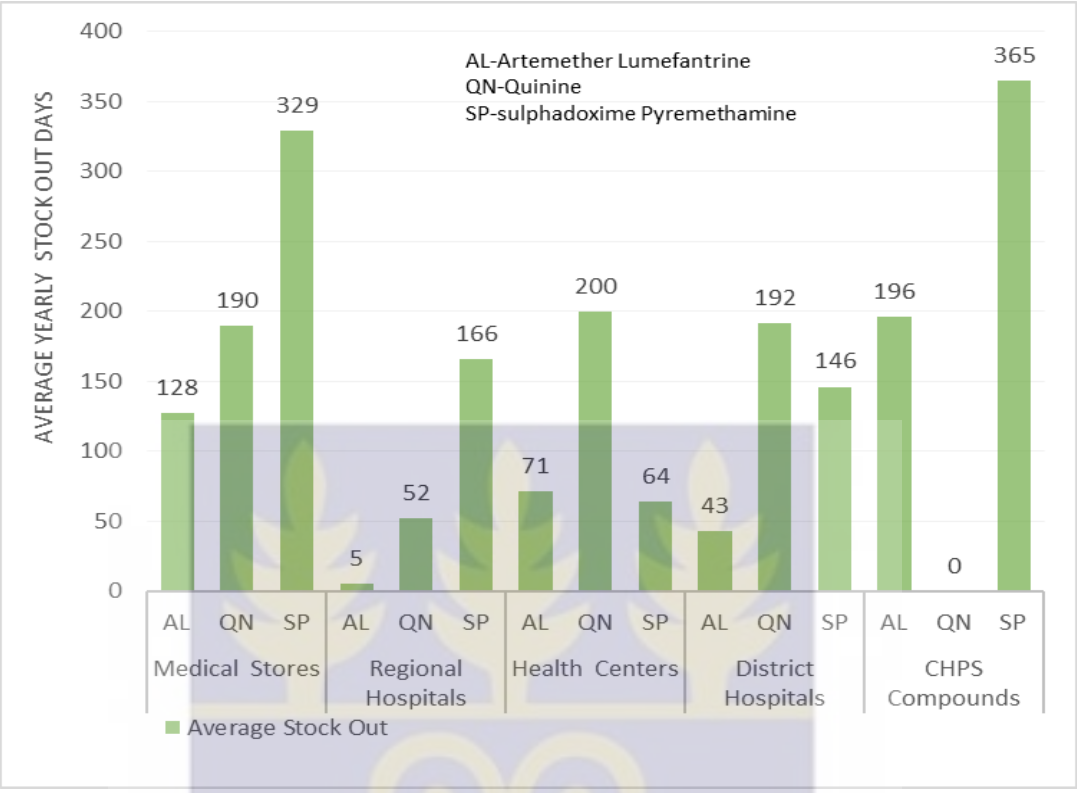

Figure 21: Stock out days of selected Antimalarials

4.1.25 Projected and Actual Mean Percentage of Essential Medicines Availability

The basis for which medicines are procured for each level of care was the inclusion of specific medicines in the procurement plan of the health facility. All 14 facilities were not able to achieve 100% of planned procurements (Figure 22). The regional medical stores, from 2011 to 2015 planned averagely for 83% of the essential medicines on the survey list and could obtain 65% of them, the regional hospitals planned an average of 82% and achieved 72% and the district hospitals planned for 79.3% achieving 58.14% over the five year period. The health centers and CHPS compound without any evidence of planning achieved 40% and 19.4% respectively.

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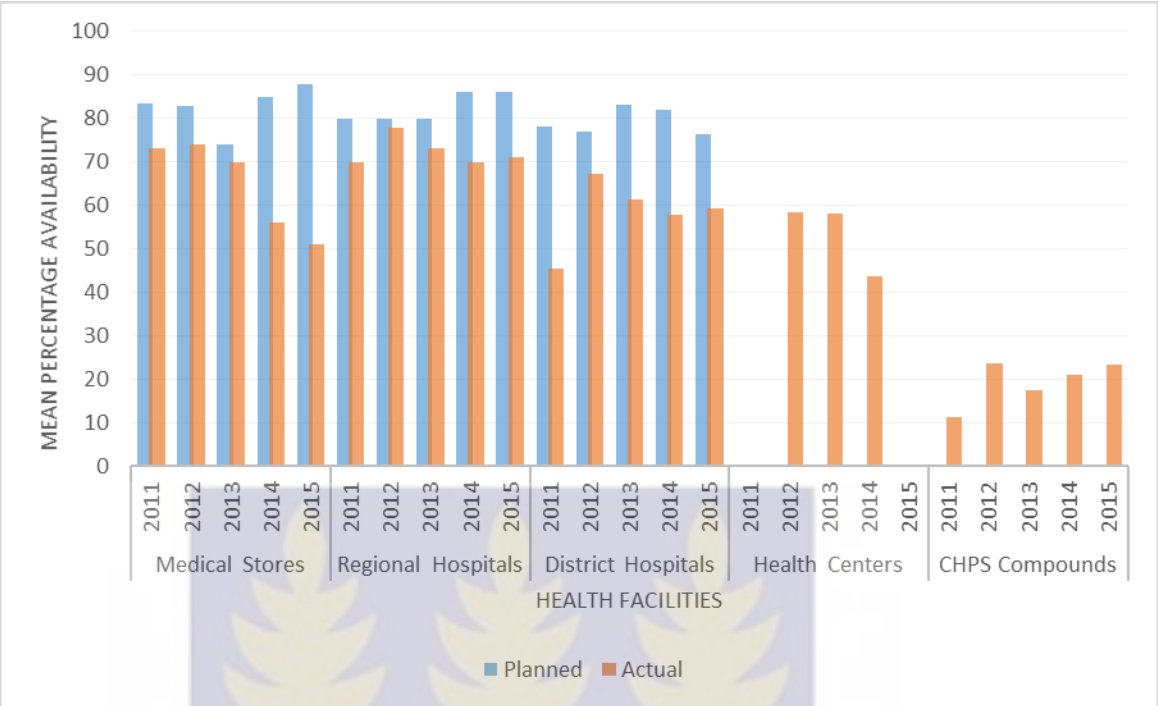

Figure 22: Projected and Actual Mean Percentage of Essential Medicines Availability

4.2 Qualitative Findings

This section summarizes and presents key information gathered from key informant interviews conducted.

4.2.1 Background Characteristics of Respondents

A total of eight (8) interviews were conducted with key informants from eight health facilities made up of the regional medical stores, two district hospitals, one health centre and four community-based health planning services compounds. Six other key informants were not available for the interview. These six informants included one from the regional hospital, one from the district hospital and four from CHPS compounds. The key informants were made up of three pharmacists, one physician assistant, two midwives and two community health nurses. All three pharmacists were heads of the pharmacy departments of their respective health facilities who had been

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in their current positions for periods between three and six years. The physician assistant, two midwives and two community health nurses were heads of the health centre and CHPS compounds respectively and had been in their current positions for between two and seven years. Five of the key informants were females and three males.

4.2.2 Perception of Availability of Essential Medicines

Three managers at the regional and district hospital level were aware of the Ghana Essential Medicine List from where they select medicines. They also sought information about medicines from the British National Formulary, the Ghana Standard Treatment Guidelines and the NHIS medicines list. These documents were used to prepare and update procurement plans at the beginning of the year and at quarterly intervals. The regional medical stores also relied on the request that health facilities made to develop their medicine list, however, this must be in line with the Essential Medicine List. Some managers had this to say

> *"…I look at the Essential Medicine List, the standard treatment guidelines and the BNF to select medicines for the facility. We also use the insurance list so that we choose medicines that the insurance will pay for. The DTC actually does the selection…."* KI002, District Hospital

> *"…We mostly stock what the hospitals request. …if we see requisitions for a particular medicines more often and we don't have, then we add it to our procurement list……"* KI001 Regional medical stores

At the health centers and CHPS compounds knowledge of the EML was more abstract as some managers did not have copies of the list to guide them on which medicines are recommended for their level but relied mainly on the medical store's requisition document, Requisition Receipt Issue and Reporting Voucher (RRIRV)

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"...we only use the medicines listed in the RRIRV" KI005, CHPS

Two pharmacists were concerned about the unavailability of life-saving medicines like Anti Rabies Vaccine and that this affects the quality of care that client receive. The Ghana Health Service has developed a tracer medicine list from which it assesses the performance of its facilities. Even with that, one manager was skeptical about the efficacy of some medicines on the list as updated lists seem not to be available to confirm their efficacy

"..... The region has a tracer medicine list and sometimes you wonder if it is updated at all. There are some medicines that I will not stock in this facility because they are not safe and even the BNF has struck it out of its list of drugs" KI004, District Hospital

One other reason that accounted for the unavailability of some essential medicines was the lack of funds to procure medicines. Most of the facilities are indebted to their suppliers due to delays in reimbursement by the NHIA. The NHIA had defaulted payments for about seven months in some facilities as reported below

"...the NHIS owes us and hasn't paid us since August last year (2015) and so we can't pay our suppliers. Most of the people who come here too have insurance so when they pay we can buy some of the drugs" KI002, District Hospital

"...we owe the regional medical stores so when you send the requisition they give you what they want because you owe them" KI006, Health centre

4.2.3 Health Managers' Perception of Affordability of Essential Medicines

The NHIS has been implemented to resolve affordability issues to most patients and health managers corroborated this assertion. The NHIS medicine price is the benchmark for determining the price of medicines to both insured and non-insured

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clients. Even with the medicine markup in the Revolving Drug Fund policy of 10% to 15%, most managers ensure that prices do not exceed the NHIS price.

> *"....we put 10 to 15% markup on the products to cater for the running of the place."*KI002, District Hospital

> *"...we price the medicine such that when the facility also puts its markup they will not exceed the insurance price"* KI001, Regional medical stores

> *"...we use the health insurance prices for everybody who comes here"* KI007, CHPS

4.2.4 Health Managers' Perception of Efficiency of Procurement and Effectiveness of Supply Chain System

Apart from the CHPS compounds and Health centers, all the higher level facilities have procurement plans which guide them in their acquisition of medicines. This is in line with the tennets of the Public Procurement Law, ACT 663.

> *"...we follow the procedures in the public procurement act, so suppliers send their quotations and the entity tender committee will evaluate and pick the suppliers with the best price for the products"* KI002, District Hospital

The lower level health facilities did not have the procurement plans and relied on the Metropolitan Health Directorate to draw up the plans. The directorate however, does not draw procurement plans for medicines for these facilities as expected:

> "*…we send all our requisitions to the metro office, so maybe they have the procurement plan there. As for us we don't do anything like that"* KI008, CHPS

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The Western Regional Health Directorate has instituted a scheduled delivery program where specific timelines have been set for facilities to submit their requisitions for medicines and non-medicine consumables and the medical stores has specific times to deliver these requested items to health facilities. The program is not working efficiently as health facilities do not submit their requisitions as scheduled.

> *".....as you pick data from the health facilities, please know that their prices may not be reflective of our prices here because they only buy about 30% of their medicines from here"* KI001, Regional medical stores

> *"...we try to send the items directly to the health facilities at our own cost because of the scheduled delivery system we run...The system is not working well because the facilities do not bring their requisition on time. Some of our suppliers also delay in bringing us the products because they complain of lack of funds to buy the products even when they have won the contract to supply. I can't go and force them because I also owe them a lot"* KI001, Regional medical stores

> *"....if there is a problem at one point in the cycle it is going to affect all the other areas and we know the problem is finance. If the insurance pay on time most of these problems will be solved"* KI002, District Hospital

Stock out of products have been attributed to lack of funds to procure enough quantities of medicines due to the indebtedness of the NHIS to health facilities.

4.3 Summary of the Chapter

The availability of essential medicines in the Sekondi-Takoradi Metropolis was 64.5% for the lowest-priced generic brands while availability was 0.3% for the originator brands. There was a declining trend in availability of essential medicines across the levels of care between 2011 and 2015. The median of MPR was 2.03 while affordability ranged from 0.2 days to 3.0 days wage. The indicators for effectiveness

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of the supply chain system showed stock out days of key antimalarials ranged from five days to one year

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CHAPTER FIVE

DISCUSSION

5.0 Introduction

The goal of achieving health for all, as declared in Alma Ata and the subsequent universal health coverage goal are still relevant in many developing countries including Ghana. According to Grossman's human capital model, individuals seek healthcare as a means of replenishing their health stock as their health depreciates (Grossman, 1999). In doing so, pharmaceuticals form a major component of the strategy of healthcare. This study sought to ascertain the level of availability of fifty essential medicines across 14 public health facilities in Sekondi Takoradi Metropolis in a cross sectional study between May and June 2016 and to assess the trends of availability over a five-year period from 2011 to 2015. The list of essential medicines selected for this survey remained relevant for the period since all medicines were chosen from the Essential Medicine List of Ghana, 2010 edition, the edition which is in use currently. The supplementary list of medicines were also selected from the Ghana Health Service's Tracer Medicines List which has not been reviewed since 2011.

5.1 Essential Medicines Availability

The availability of essential medicines in this study remained low in the Metropolis in all the public health facilities which serves majority of inhabitants in the geographical location. A mean essential medicines availability of 64% at the time of the survey was below the WHO benchmark of 80% (World Health Organization & Health Action International, 2008). Facility level availability, especially at the CHPS level was

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lowest even though the level had fewer drugs on the list. Only 42.9% of the 13 essential medicines were available. This raises concern about the capacity of these community level facilities to manage minor ailments that may in turn influence the referral of patients to higher levels of care. In a study conducted in Ghana, only 8.1% of patients referred were actually admitted, implying the rest of the patients could have been treated if the referring facility had the capacity to do so (Sagoe-Moses, 2003).

People seek healthcare from specific health facilities not because of perceived quality of service but because of low cost of services and availability of medicines (Sagoe-Moses, 2003). Thus the availability of medicines could reduce congestion at higher levels of care. Interestingly, the five-year trend of essential medicines availability was also much lower at the community level with a yearly average of 19.1%. The current trend of delays in NHIS reimbursement may worsen the situation as described by one pharmacy manager

> "……*if the health insurance doesn't pay us, the situation will get worse as we cannot pay our suppliers to replenish our stock of essential drugs*"

It is worth noting that first line antimalarial was available in all facilities at the time of the survey, reflecting the efforts being made to contain malaria in the metropolis and the country at large. However, only 30.8% (approximately 4) of the facilities had the recommended prophylaxis for malaria, Sulphadoxime Pyrimethamine (SP), which is mainly given to pregnant women. This is a programme drug supplied by the government of Ghana that is given free of charge to clients.

Another program drug for treating sexually transmitted disease, syphilis was also not available in any facility at the time of the study and had not been available between

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2011 and 2015.The prevalence of syphilis in the Western Region is 0.4% second to the Central Region which is 0.9% in the country (National AIDS Control Programme, 2016). Similarly Anti-Rabies Vaccine, salbutamol inhaler, aciclovir tablets and simvastatin were not available in any of the 14 public health facilities. The only ophthalmic medicine, Tetracycline eye ointment, was also not available in the 14 public health facilities. The unavailability may lead to an increase in the prevalence of these diseases of national interest.

Availability of essential medicines at regional medical stores is crucial to ensure that the primary level facilities provide medicines at low cost and ensure constant availability as indicated by one facility manager:

> *"...we only get what is available at the Regional Medical Stores. If we send the requisition and they don't have then we also don't have"*

At the time of the survey, the regional medical stores had only 58%(28medicines) of the list of essential medicines available and this will invariably affect public hospitals, clinics and CHPS compounds who rely mainly on the medical stores for their essential medicine needs. The essential medicine availability trend could be lower in more rural districts of the region, knowing that the Sekondi-Takoradi Metropolis has 96.1% urban households and the highest in the Western Region, as the availability trends has been observed in other studies (Ghana Statistical Service, 2014a; Malm *et al.*, 2013; Ministry of Health, 2009). A declining trend in availability of medicines over the years was observed and this has been attributed also to the lack of funds to procure medicines to replenish stocks. Some health facilities have not been reimbursed for services they rendered to NHIS subscribers since April, 2015 (Myjoyonline, 2016). Managers at most facilities visited complained about the level

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and duration of indebtedness of the NHIA to them and that impedes smooth running of health services. About 80% of health facilities revenue come from reimbursement by the NHIA (National Health Insurance Authority, 2013) and delays in paying health facilities this huge proportion of their internally generated funds may negatively affect procurements to replenish medicines stocks. Delayed reimbursement by health insurance companies becomes a disincentive to health managers, thus some may withdraw from providing services under the insurance scheme (Cunningham & Malley, 2009)

Health facility revenues generally increased over the five year period with the health centre achieving about 292% increase, regional hospitals 128%, CHPS with 100% and district hospitals with 26%. This increasing trend did not however, lead to an increase in availability of essential medicines. The increasing health facility drug revenue could be as a results of increasing medicine prices mainly from increasing importation fees and foreign exchange factors and not as a results of increased utilization of services (Mordi, Eghan, & Rankin, 2015). Attendance at the 14 health facilities generally declined averaging approximately 10% across the 14 health facilities Thus increases in revenue may be as a results of upward reviews of the medicine prices on the NHIA's medicine list in 2013 and 2014.

5.2 Affordability of Essential Medicines

The ability of clients to pay for health services, including medicines has been one of the main goals of the various health financing methods. The goal is to ensure that families and individuals do not suffer financial hardships as a results of paying for health services and medicines (World Health Organization, 2010). The MSH's international buyer prices give an opportunity to compare prices of medicines across

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countries (World Health Organization & Health Action International, 2008). The median of Median Price Ratio (MPR) for the medicines in this study was 2.03. This indicates that prices at which patients obtain medicines from public health facilities in the Sekondi-Takoradi Metropolis is twice the price of the same medicine on the international market. It must be emphasized that about 79% of patients who seek services at health facilities in the metropolis are insured under the NHIS (Ghana Health Service, 2015), and may be protected from making out-of-pocket payment at the point of service. Thus, about 21% of patients at the point of services pay two times the price for medicines. It is also worth noting that the Western region makes up 9% of the total NHIS active membership which stood at 38% of the total population in Ghana (National Health Insurance Authority, 2013). About 71% of people who are not enrolled on the NHIS complain of their inability to afford premiums (Jehu-appiah, Aryeetey, Agyepong, Spaan, & Baltussen, 2011). This presupposes that poor people are not enrolled and thus may be suffering some financial catastrophe as they acquire medicines.

Most of the public facilities use the NHIS medicines reimbursement rates as a benchmark for setting prices for the uninsured and therefore the median MPR obtained is a reflection of the price level of the NHIS. This is evident in responses of key informants in this study:

"...we use the health insurance prices for everybody who comes here"

The procurement price at the regional medical store has a median price ratio of 1.04 almost similar to international reference prices. However, as the medicines move from the medical stores, through the health facilities, markups totaling about 30% are placed on the cost of the medicines. Key informants at various levels indicated that

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"....we put 10 to 15% markup on the products to cater for the running of the place."

The policy guideline set by the Ghana National Drug Programme, however sets the limit of markup to a maximum of 10% (Ghana National Drugs Programme, 2004). Adhering to this 10% markup required strict monitoring and political backing which makes it difficult for health facilities to comply fully (World Health Organization, 2015b).

Specific disease conditions thus may take substantial portions of the income of the lowest unskilled government worker if he/she or his/her dependents becomes sick and requires drug therapy. The minimum daily wage at the time of this study stood at GH¢8.00 (Government of Ghana, 2016). Treatment for the most reported disease, malaria, would require 0.4 days' income to buy a 3-day course of antimalarial. Thus a person who suffers an episode of malaria will spend a minimum of 1.5% of their monthly income on one medicine. According to the Ghana Statistical Service, the mean annual household per capita expenditure on health in the country is 1.1% of total household expenditure (Ghana Statistical Service, 2014b). Thus, treatment of the most common ailment cost more than the mean per capita household expenditure on health.

A pregnant woman with malaria spends 1.8days' income on the antimalarial recommended for her by the Ghana Standard Treatment Guideline, making up about 6.7% of her monthly income. Expenditure on healthcare is income inelastic, thus there is less than a proportionate change in expenditure with a unit change in income (Mohanty, Landusingh, Kastor, Chauhan, & Bloom, 2016). The GSS also indicated in their GLSS Round 6 that just about one-fifth (20.02%) of Ghanaians are employed in a waged work, thus many people may be earning below the daily minimum wage set

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by the government. In Ghana, the incidence of poverty is 24.2% and 20.9% in the Western Region while the incidence of extreme poverty is 8.4% and 5.5% respectively. These poor and extremely poor people may be earning $1.83 (GH¢7.03) and $1.10 (GH¢4.23) respectively per day below the minimum wage (Ghana Statistical Service, 2014c). According to the UN, the proportion of employed people living on less than $1.25 a day remains high at 36% in Sub-Saharan Africa (United Nations, 2015b). This low income level implies that a number of people in the working group are living in extreme poverty and thus may not be able to afford essential medicines or may be drawn below the poverty threshold when they pay for essential medicines. The use of the minimum wage, as suggested by Niens *et al* (2012) may thus overestimate the affordability of medicines since majority of the population in low and middle income countries earn less than the minimum wage.

In treating certain diseases, such as acute respiratory tract infections, prescribers will have the option of choosing between antibiotics based on the patients presenting symptoms and tolerability of medicines. A course of amoxicillin requires 0.6 day's wage, while cefuroxime requires 2.8 days' wage and an alternative to patients who may react adversely to any of these two will require one and half days' wage to acquire these medications. Essential medicines are thus not affordable to majority of inhabitants in the metropolis if one requires 40% of a day's income to buy the first line medicines for malaria. This amount excludes other direct and indirect costs to treat this disease in the public sector.

For severe infections of the respiratory tract, about 20% of the population will work for almost 3 days in order to procure cefuroxime for treatment. The situation is worsened if these patients have multiple diseases. To make medicines more affordable and reduce government spending on pharmaceuticals, studies have shown that large

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scale negotiations with pharmaceutical manufacturers and sellers may lead to benefits from economies of scale (Stabile *et al*., 2013).

Strict enforcement of the mark-up regime on health commodities will be a key step at ensuring that medicines are not over-priced. The findings of this study may be evident of the MOH and the GNDP inability to enforce the 10% maximum mark-up stipulated in the National Drug Policy of 2004. This enormous work of ensuring adherence to mark-up regulations requires strong political support and a clear strategy for enforcement. The national health insurance may also adopt external reference pricing as benchmarks for negotiating prices with pharmaceutical manufacturers and suppliers to make medicines more affordable (Ghana National Drugs Programme, 2004; World Health Organization, 2015b).

5.3 The Procurement and Supply Chain System Effectiveness

Another objective of this study was to assess the efficiency of the procurement system and to ascertain the effectiveness of the supply chain system in the Metropolis. The main buyer of medicines for the country is the Central Medical Stores (CMS), while the Regional Medical Stores (RMS) sources medicines at the regional level. The procurement price ratio is an indication of the competitiveness of the price at which medicines are procured by these institutions. According to the World Health Organization (WHO) and Health Action International (HAI), procurement prices for the lowest-priced generically equivalent products should be fairly close to the MSH international supplier/buyer prices (that is, ratios up to 1.00).

MPRs of 1.00 or less indicate that the procurement system is working efficiently, while MPRs above 1.00 raise questions about purchasing efficiency (World Health Organization & Health Action International, 2008). The median MPR at the medical

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stores is 1.04, ranging from as low as 0.13 to a high of 8.17 and 50% of prices ranging from 0.54 to 1.39. The system according to this standard is fairly efficient and efforts should be made to make it more efficient. It is certainly important that this efficiency translates to the patient at the point of service delivery. The case is, however, different as medicines prices at public health facilities are mostly about two times the international market price.

Procurement planning is key to ensuring availability as is observed in this study. Health facilities that had a procurement plan had much higher availability compared to those that did not have a plan. Health centers and CHPS compounds must be encouraged to draw up plans to guide them in their procurement of medicines, even if they obtain all medicines from the medical stores.

The number of stock out days is also used as a measure of the effectiveness of the supply chain system (Haszlinna Mustaffa & Potter, 2009). That is making the product available to the client when it is needed. Antimalarials are one major group of medicines that should be available at all times in the year due to the endemic nature of malaria in the country and the metropolis. For the first line antimalarial assessed in the study, Artemether Lumefantrine, it was out of stock for an average of 4months in each year from 2011 to 2015, while the medicine for prophylaxis was almost not available for the whole period. Similar reasons of unavailability of funds is adduced for these shortages. Lack of funds could be a factor. However, other factors such as inaccuracies in estimation of required stock levels and low storage capacities may greatly affect all-year-round availability of a product. In line with Haszlinna *et al* (2009), the high number of stock out days connotes an ineffective supply chain system:

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"....if there is a problem at one point in the cycle it is going to affect all the other areas and we know the problem is finance. If the insurance pay on time most of these problems will be solved"

This finding is corroborated by the United Nations call to low-income and middle-income countries to increase domestic resources to cater for the many patients with non-communicable diseases who do not have access to medications for treatment (Hogerzeil *et al*., 2013)

The Short-Message Service (SMS) for Life study conducted in Kenya, recognized the high rates of stock outs across health facilities and piloted an SMS system where stock levels of antimalarials were reported weekly for prompt action to be taken. This technology resulted in a 38% decline in stock out rates across five districts (Githinji, Kigen, Memusi, Nyandigisi, & Zurovac, 2013). The main technique employed was the redistribution of medicines to areas that had run out of stock. This technique could be applicable in the Sekondi-Takoradi Metropolis as the findings revealed a seemingly low stock out days of Artemether Lumefantrine (AL) in the regional hospital over the 5 year period. With a collaborative effort, some medicines could be moved from the regional hospital to the CHPS compounds to prevent referrals from lower level to the regional hospitals. Stock of ACTs, including AL may lead to an increase in household expenditure through out-of-pocket payments for these medicines in the private sector.

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5.4 Limitations to the Study

Morbidity data was not readily available at the health facility level due to filing challenges, however, morbidity data obtained from the metropolitan health directorate did not include 2011 and 2012 data.

The 2014 MSH price data was used as a reference to the May, 2016 patient prices at the public health facilities that took part in the study. However, according to WHO/HAI, price variations between years may not lead to a significant change in the analysis (World Health Organization & Health Action International, 2008)

The study did not determine association between factors that affected availability of essential medicines, thus concrete reasons could not be adduced to the low availability of essential medicines in the metropolis.

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CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.0 Introduction

This section draws conclusion from the results and discussions. The conclusions are drawn in line with the specific objectives of the study which include assessment of availability of essential medicines in public health facilities in Sekondi-Takoradi Metropolis and also to determine the trend of availability of the selected essential medicines from 2011 to 2015.

Recommendations are also given in line with the specific objectives, findings and conclusions drawn from the study.

6.1 Conclusion

The availability of essential medicines continues to be low in the Sekondi-Takoradi Metropolis at 64.5% in this Study. The most available essential medicines included Artemether Lumefantrine which is used to treat uncomplicated malaria. Unavailable medicines include very important program drugs used to manage syphilis and malaria. The trends of availability over the five year period from 2011 to 2015 is also below the WHO recommended threshold of 80% across all 14 public health facilities in the Metropolis participating in the study. Prices of essential medicines are two times higher than the international reference price published by MSH. The lowest paid unskilled government worker requires between about 0.3 days (GH¢2.40) to 2.8 days GH¢22.40) wage to pay for treatment with a course of an essential medicine for the most common disease conditions in the metropolis. The procurement system is efficient with competitive procurement price similar to international prices published

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by the MSH. The supply chain system in the metropolis is not effective as the level of stock outs for key antimalarials remains as high as 365days in a year. Prices of medicines remains high and it is important that strict medicine pricing policies are adhered to in order to make medicines more affordable to the majority of Ghanaians.

6.2 Recommendations

The wide gap between procurement prices and patient retail prices should be investigated by the Western Regional Health Administration to understand the reasons for the high prices of essential medicines which may inform subsequent policies on pharmaceutical pricing in the country.

Further studies should be undertaken by the Western Regional Health Administration to assess the availability and affordability of essential medicines in the private sector and the Western Region as a whole.

The Sekondi-Takoradi Metropolitan Health Administration should ensure comprehensive procurement planning for medicines at the CHPS compound and health centre levels to ensure that the appropriate essential medicines are available at these levels. This may reduce referrals to higher level facilities as these facilities will be able to manage the most prevalent disease conditions with these medicines at that level of care.

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APPENDICES

Appendix A: Consent Form

Consent Form for Participation in Research Study

University of Ghana, School of Public Health

Topic: Assessment of Availability of Essential Medicines in Public Health Facilities in Sekondi-Takoradi Metropolis

Description of the research and your participation

You are invited to participate in a research study conducted by Alfred Osei-Assibey. The purpose of this research is to assess the factors that affect the availability of essential medicines in public health facilities in Sekondi-Takoradi Metropolis. It will also assess the availability and affordability of some essential medicines in your health facility.

Your participation will involve providing the researcher with information on records of medicine availability on Stock Control Cards and/or Stores Ledger from 2011 to 2015 and the revenue generation form 2011 to 2015. Your medicine stock will be physically observed for availability of unexpired essential medicines in the medicine list provided. You will also be asked for the current price at which non-insured patients obtain these medicines from your facility. The researcher will conduct an interview with you and may require that the interview be recorded with a voice recorder to facilitate easy transcription and save you much time. The application of the study tools will require only 45minutes of your time.

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Risks and discomforts

There are no known risks associated with this research to you. The study will however take few minutes of your time.

Potential benefits

The benefits of this research to you, will be to give you information about the current availability and affordability of essential medicines in your facility compared to the WHO, HAI and GHS standard and to inform your facility's policy decisions on factors that affect availability of these essential medicines to guide your decision to stock these medicines which will inure to the benefit of your clients. A copy of the final report will be made available to your facility.

Protection of confidentiality

I will do everything to protect your privacy. Data collection sheets and recorder will be kept under lock and key for up to 12months after completion of this project Data obtained from reviewing your records will be limited to discussion of this survey. Your identity and that of your institution will not be revealed in any publication resulting from this study

Voluntary participation

Your participation in this research study is voluntary. You may choose not to participate and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw at any time from this study.

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Compensation

You will not be financially compensated for your participation in this study

Data Usage and Storage

The information you provide will only be used for the purpose of this study. Data gathered from records from your institution will also be used for purposes of analysis of this study. The data collection documents will be kept under lock and key and destroyed 1year after completion of the final report.

Dissemination of Study Report

Copies of the final report will be made available to your institution, the regional health directorate and the School of Public Health, University of Ghana.

Potential Conflict of Interest

The researcher is a staff of the Ghana Health Service. However, this will not affect processing, analysis and discussion of results of finding in this research work.

Contact information

If you have any questions or concerns about this study or if any problems arise, please contact Alfred Osei-Assibey at University of Ghana, School of Public Health on 020-7415719, email: aoseiassibey@gmail.com. If you have any questions, further clarifications or concerns about your rights as a research participant, please contact the Administrator of the Ghana Health Service Ethics Review Committee, Hannah Frimpong 0507041223

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Consent

I have read and I understand the contents this consent form and have been given the opportunity to ask questions for which I have been adequately answered. I voluntarily give my consent to participate in this study.

Participant's signature_____

Date:_____

Researcher's signature_____

Date:_____

A copy of this consent form should be given to you.

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Appendix B: List of Essential Medicines for Survey

MEDICINE	STRENGTH	UNIT OF MEASURE	CATEGORY	LEVEL OF USE	MSH MEDIAN SUPPLIER PRICE ($)	MSH MEDIAN BUYER PRICE ($)
Aciclovir tablet	200mg	tab/cap (non dispersible)	REGIONAL CORE	B2	0.0424	0.0620
Albendazole suspension	100mg/5ml	Millilitre	SUPPLEMENTARY	A/M	0.0097	0.0331
Albendazole tablet	400mg	tab/cap (non chewable	REGIONAL CORE	A	0.0214	0.1723
Amitriptyline tablet	25mg	cap/tab	GLOBAL CORE	C	0.0080	0.0204
Amoxicillin capsule	500mg	cap/tab	GLOBAL CORE	B1	0.0313	0.0305
Anti-Rabies Vaccine injection		Vial	SUPPLEMENTARY	B1	8.6400	19.2772
Artemether +Lumefantrine tablet	20/120mg	tab/cap	REGIONAL CORE	A	0.0885	0.1365
Atenolol tablet	50mg	cap/tab	GLOBAL CORE	B2	0.0118	0.0066
Benzathine Benzyl Penicillin Injection	2.4MIU/ml	Vial	REGIONAL CORE	PD	0.2508	0.3636
Benzyl Penicillin injection	1MU	Vial	SUPPLEMENTARY	B2	0.0806	0.2199
Carbamazepine tablet	200mg	cap/tab	REGIONAL CORE	C	0.0190	0.0279
Ceftriaxone Injection	1g vial	Vial	GLOBAL CORE	C	0.5887	0.4838
Cefuroxime tablet	250mg	cap/tab	REGIONAL CORE	C	0.1345	0.1807
Chlorpheniramine tablet	4mg	cap/tab	SUPPLEMENTARY	A/M	0.0023	0.0041
Ciprofloxacin tablet	500mg	cap/tab	GLOBAL CORE	B1	0.0418	0.0380
Clotrimazole pessary	100mg	Pessary	REGIONAL CORE	B2/M	0.0908	0.1592

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MEDICINE	STRENGTH	UNIT OF MEASURE	CATEGORY	LEVEL OF USE	MSH MEDIAN SUPPLIER PRICE (%)	MSH MEDIAN BUYER PRICE ($)
Co-Trimoxazole Suspension	8+40mg/ml	Millilitre	GLOBAL CORE	B1	0.0122	0.0156
Co-Trimoxazole tablet	80+400mg	cap/tab	REGIONAL CORE	B1	0.0122	0.0156
Dextrose infusion	50%	Millilitre	SUPPLEMENTARY	B2	0.0159	0.0138
Diazepam tablet	5mg	cap/tab	GLOBAL CORE	M	0.0080	0.0043
Diclofenac Suppository	100mg	Suppository	SUPPLEMENTARY	A/M	0.0976	0.2426
Diclofenac tablet	50mg	cap/tab	GLOBAL CORE	B2	0.0064	0.0099
Erythromycin tablet	250mg	cap/tab	REGIONAL CORE	B1/M	0.0393	0.0428
Ferrous Salt+ Folic Acid tablet	200mg(60mg iron)+0.4mg	cap/tab	REGIONAL CORE	A	0.0032	0.0330
Folic Acid tablet	5mg	cap/tab	SUPPLEMENTARY	B1/M	0.0029	0.0039
Frusemide injection	10mg/ml	Millilitre	SUPPLEMENTARY	B2	0.0755	0.1482
Frusemide tablet	40mg	cap/tab	SUPPLEMENTARY	B2	0.0058	0.0100
Glibenclamide tablet	5mg	cap/tab	GLOBAL CORE	B2	0.0067	0.0052
Hydrocortisone injection	100mg	Vial	SUPPLEMENTARY	B1	0.5586	0.5930
Ibuprofen tablet	200mg	cap/tab	SUPPLEMENTARY	B1/M	0.0072	0.0085
Losartan tablet	50mg	cap/tab	SUPPLEMENTARY	D	0.1727	0.0132
Methyldopa tablet	250mg	cap/tab	SUPPLEMENTARY	B2	0.0315	0.0475
Metronidazole injection	5mg/ml	Millilitre	SUPPLEMENTARY	B2	0.0065	0.0062
Metronidazole tablet	200mg	cap/tab	REGIONAL CORE	B1/M	0.0063	0.0073
Multivitamin tablet	WHO formulation	cap/tab	SUPPLEMENTARY	A/M	0.0055	0.0144
Nifedipine tablet	20mg	cap/tab	SUPPLEMENTARY	B2	0.0299	0.0212
Normal Saline infusion	0.90%	Millilitre	SUPPLEMENTARY	B1	0.0010	0.0010
Omeprazole capsule	20mg	cap/tab	GLOBAL CORE	D	0.0213	0.0248

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MEDICINE	STRENGTH	UNIT OF MEASURE	CATEGORY	LEVEL OF USE	MSH MEDIAN SUPPLIER PRICE ($)	MSH MEDIAN BUYER PRICE ($)
Oral Rehydration Salts powder	WHO formulation	Powder sachet (1L)	REGIONAL CORE	A/M	0.0998	0.1101
Oxytocin injection	10IU/ml	Millilitre	SUPPLEMENTARY	B1/M	0.1885	0.2186
Paracetamol Syrup	120mg/5ml	Millilitre	GLOBAL CORE	A/M	0.0069	0.0038
Paracetamol tablet	500mg	cap/tab	SUPPLEMENTARY	A	0.0048	0.0060
Povidone Iodine solution	10%	Millilitre	SUPPLEMENTARY	B1	0.0069	0.0048
Promethazine injection	25mg/ml	Millilitre	SUPPLEMENTARY	B1/M	0.0938	0.3403
Quinine tablet	300mg	cap/tab	SUPPLEMENTARY	B2/M	0.0592	0.1315
Ringers Lactate infusion	500ml	Millilitre	SUPPLEMENTARY	B1/M	0.0011	0.0010
Salbutamol Inhaler	100mcg/dose	Dose	GLOBAL CORE	B1	0.0099	0.0107
Simvastatin tablet	20mg	cap/tab	GLOBAL CORE	C	0.0235	0.0238
Sulphadoxine+pyremethamine tablet	500+25mg	cap/tab	REGIONAL CORE	PD	0.0331	0.1104
Tetracycline Eye Ointment	1%	Gram	REGIONAL CORE	B1	0.0603	0.0597

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Appendix C: Checklist and Data Collection forms

MEDICINE PRICE AND AVAILABILITY DATA COLLECTION FORM

Use a separate form of each medicine outlet

Date:_____ Survey Area Number:_____
Name of Town/Village
Name of Medicine Outlet(Optional)
Medicine Outlet Unique Survey ID(Mandatory)
Distance in Kilometers from Metropolitan Capital:
Type of Medicine Outlet:
☐ Public Sector Facility (specify level of care below) ☐ CHPS ☐ Health center ☐ District Hospital ☐ Regional Hospital
Type of Price: ☐ Procurement Price ☐ Price the Patient pays

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Procurement Register 2016 ☐ Available for medicines ☐ Not available for medicines
Type of Data: ☐ Sample Outlet ☐ Back-up Outlet ☐ Validation Visit
Name of Manager of Medicine Outlet:
Name of Person(s) who provided information on medicine(If different from manager):
Name of Data Collector(s)

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Price and availability Data Collection form

No.	Generic name, dosage form and strength	Medicine Type	Brand or product name	Manufacturer	Available: "Yes" or "no"	Packet size found	Price of packet found (GHS)	Unit price (4 digits) (GHS)	comments
1	Aciclovir tablet 200mg	Originator							
		Lowest-priced generic							
2	Albendazole chewable tablet 400mg	Originator							
		Lowest-priced generic							
3	Albendazole suspension 100mg/5ml in 20ml	Originator							
		Lowest-priced generic							
4	Amitriptyline tablet 25mg	Originator							
		Lowest-priced generic							
5	Amoxicillin capsule 500mg	Originator							
		Lowest-priced generic							
6	Anti-Rabies Vaccine	Originator							
		Lowest-priced generic							
7	Artemether Lumefantrine tablet 20mg/120mg	Originator							
		Lowest-priced generic							
8	Atenolol tablet 50mg	Originator							
		Lowest-priced generic							
9	Benzathine Benzyl Penicillin injection 2.4 mega units vail	Originator							
		Lowest-priced generic							
10	Benzyl Penicillin injection 1 mega unit vial	Originator							
		Lowest-priced generic							
11	Carbamazepine tablet 200mg	Originator							
		Lowest-priced generic							
12	Ceftriaxone Sodium injection 1000mg vial	Originator							
		Lowest-priced generic							
13	Cefuroxime Axetil tablet 250mg	Originator							
		Lowest-priced generic							
14	Chlorpheniramine maleate tablet 4mg	Originator							
		Lowest-priced generic							
15	Ciprofloxacin tablet 500mg	Originator							
		Lowest-priced generic							
16	Clotrimazole Vaginal	Originator							

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	pessary 100mg	Lowest-priced generic							
17	Co-Trimoxazole tablet 80mg/400mg	Originator							
		Lowest-priced generic							
18	Co-Trimoxazole suspension 40mg/200mg/5ml	Originator							
		Lowest-priced generic							
19	Dextrose 50% Infusion in 250ml	Originator							
		Lowest-priced generic							
20	Diazepam tablet 5mg	Originator							
		Lowest-priced generic							
21	Diclofenac Sodium tablet 50mg	Originator							
		Lowest-priced generic							
22	Diclofenac Sodium suppository 100mg	Originator							
		Lowest-priced generic							
23	Erythromycin tablet 250mg	Originator							
		Lowest-priced generic							
24	Ferrous sulphate + Folic Acid capsule 60mg elemental iron + 400micrograms	Originator							
		Lowest-priced generic							
25	Folic Acid tablet 5mg	Originator							
		Lowest-priced generic							
26	Frusemide injection 20mg/ml in 2ml	Originator							
		Lowest-priced generic							
27	Frusemide tablet 40mg	Originator							
		Lowest-priced generic							
28	Glibenclamide tablet 5mg	Originator							
		Lowest-priced generic							
29	Hydrocortisone succinate injection 100mg vial	Originator							
		Lowest-priced generic							
30	Ibuprofen tablet 200mg	Originator							
		Lowest-priced generic							
31	Losartan Potassium tablet 50mg	Originator							
		Lowest-priced generic							
32	Methyldopa tablet 250mg	Originator							
		Lowest-priced generic							
33	Metronidazole injection	Originator							

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	5mg/ml in 100ml	Lowest-priced generic							
34	Metronidazole tablet 200mg	Originator							
		Lowest-priced generic							
35	Multivitamin tablet	Originator							
		Lowest-priced generic							
36	Nifedipine tablet retard 20mg	Originator							
		Lowest-priced generic							
37	Omeprazole capsule 20mg	Originator							
		Lowest-priced generic							
38	Oral Rehydration salt powder for 1000ml solution	Originator							
		Lowest-priced generic							
39	Oxytocin injection 10IU/ml in 1ml	Originator							
		Lowest-priced generic							
40	Paracetamol tablet 500mg	Originator							
		Lowest-priced generic							
41	Paracetamol syrup 120mg/5ml in 100mls	Originator							
		Lowest-priced generic							
42	Povidone Iodine solution 10% in 100ml	Originator							
		Lowest-priced generic							
43	Promethazine Hydrochloride injection 25mg/ml in 2ml	Originator							
		Lowest-priced generic							
44	Quinine Sulphate tablet 300mg	Originator							
		Lowest-priced generic							
45	Ringers Lactate infusion 500mls	Originator							
		Lowest-priced generic							
46	Salbutamol inhaler 100micrograms/dose in 200doses	Originator							
		Lowest-priced generic							
47	Simvastatin tablet 20mg	Originator							
		Lowest-priced generic							
48	Sodium Chloride infusion 0.9% in 500ml	Originator							
		Lowest-priced generic							
49	Sulphadoxime + Pyremethamine tablet 500mg+25mg	Originator							
		Lowest-priced generic							

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50	Tetracycline eye ointment 1% in 5g	Originator							
		Lowest-priced generic							

3. Medicine availability over 5year period.

Q1 refers to 31st March, Q2 = 30th June, Q3 =30 September, Q4 = 31st December

	Year	2011				2012				2013				2014				2015			
No.	Generic name, dosage form and strength	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1	Aciclovir tablet 200mg																				
2	Albendazole chewable tablet 400mg																				
3	Albendazole suspension 100mg/5ml in 20ml																				
4	Amitriptyline tablet 25mg																				
5	Amoxicillin capsule 500mg																				
6	Anti-Rabies Vaccine																				
7	Artemether Lumefantrine tablet 20mg/120mg																				
8	Atenolol tablet 50mg																				
9	Benzathine Benzyl Penicillin injection 2.4 mega units vail																				

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10	Benzyl Penicillin injection 1 mega unit vial																				
11	Carbamazepine tablet 200mg																				
12	Ceftriaxone Sodium injection 1000mg vial																				
13	Cefuroxime Axetil tablet 250mg																				
14	Chlorpheniramine maleate tablet 4mg																				
15	Ciprofloxacin tablet 500mg																				
16	Clotrimazole Vaginal pessary 100mg																				
17	Co-Trimoxazole tablet 80mg/400mg																				
18	Co-Trimoxazole suspension 40mg/200mg/5ml																				
19	Dextrose 50% Infusion in 250ml																				
20	Diazepam tablet 5mg																				
21	Diclofenac Sodium tablet 50mg																				
22	Diclofenac Sodium suppository 100mg																				
23	Erythromycin tablet 250mg																				
24	Ferrous sulphate + Folic Acid capsule																				

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	60mg elemental iron + 400micrograms																				
25	Folic Acid tablet 5mg																				
26	Frusemide injection 20mg/ml in 2ml																				
27	Frusemide tablet 40mg																				
28	Glibenclamide tablet 5mg																				
29	Hydrocortisone succinate injection 100mg vial																				
30	Ibuprofen tablet 200mg																				
31	Losartan Potassium tablet 50mg																				
32	Methyldopa tablet 250mg																				
33	Metronidazole injection 5mg/ml in 100ml																				
34	Metronidazole tablet 200mg																				
35	Multivitamin tablet																				
36	Nifedipine tablet retard 20mg																				
37	Omeprazole capsule 20mg																				
38	Oral Rehydration salt powder for 1000ml solution																				

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39	Oxytocin injection 10IU/ml in 1ml																				
40	Paracetamol tablet 500mg																				
41	Paracetamol syrup 120mg/5ml in 100mls																				
42	Povidone Iodine solution 10% in 100ml																				
43	Promethazine Hydrochloride injection 25mg/ml in 2ml																				
44	Quinine Sulphate tablet 300mg																				
45	Ringers Lactate infusion 500mls																				
46	Salbutamol inhaler 100micrograms/dose in 200doses																				
47	Simvastatin tablet 20mg																				
48	Sodium Chloride infusion 0.9% in 500ml																				
49	Sulphadoxime + Pyremethamine tablet 500mg+25mg																				
50	Tetracycline eye ointment 1% in 5g																				

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REVENUE INFORMATION COLLECTION SHEET

YEAR	REVENUE SOURCE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
2011	NHIS												
	OOP												
2012	NHIS												
	OOP												
2013	NHIS												
	OOP												
2014	NHIS												
	OOP												
2015	NHIS												
	OOP												

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SECTION D: TOP FIVE OUTPATIENT DEPARTMENT MORBIDITIES FOR 5YEARS

2011	2012	2013	2014	2015

B. How many essential medicines in the list are on the annual procurement register

2011	2012	2013	2014	2015

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STOCK OUT DAYS OF ANTIMALARIALS

MEDICINE	YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Artemether Lumefantrine tablet 20mg/120mg	2011													
	2012													
	2013													
	2014													
	2015													
Quinine Sulphate tablet 300mg	2011													
	2012													
	2014													
	2015													
Sulphadoxime + Pyremethamine tablet 500mg+25mg	2011													
	2012													
	2013													
	2014													
	2015													

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Appendix D: Interview Guide for In-depth Interview

1. What is your position in the facility?
2. Why does your facility have the medicines that are in stock?
3. How are medicines selected for use in the facility?
4. Does the facility have an institutional essential medicine list?
5. What medicines do you mostly stock in this facility?
6. What has been the top 5 morbidities that patients present to your facility?
7. How are prices of medicines determined in your facility?
8. How do you procure drugs for this facility
9. How are medicines distributed from the regional medical stores or health facility?
10. How are drugs distributed from this facility to other facilities?
11. What storage facilities do you have for stocking medicines? Are you able to procure essential medicines to the stores?
12. How long do drugs you procure last? Have there been occasions of expiry of medicines in your facility? What were the causes of the expiry?
13. What factors account for availability of essential medicines in this facility?
14. What do you think can be done to improve availability of essential medicines in your facility?

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Appendix E: GHS Ethic Review Board Clearance Letter

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

My Ref. GHS/RDD/ERC/Admin/App
Your Ref. No.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Tel: +233-302-681109
Fax + 233-302-685424
Email: Hannah. Frimpong@ghsmail.org

11th March, 2016

Alfred Osei-Assibey
University of Ghana
School of Public Health
Legon, Accra

ETHICS APPROVAL - ID NO: GHS-ERC: 71/12/15

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol titled:

"Assessment of Availability of Essential Medicines in Public Health Facilities in Sekondi-Takoradi Metropolis"

This approval requires that you submit yearly review of the protocol to the Committee and a final full review to the Ethics Review Committee (ERC) on completion of the study. The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Please note that any modification without ERC approval is rendered invalid.

You are also required to report all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.

You are requested to submit a final report on the study to assure the ERC that the project was implemented as per approved protocol. You are also to inform the ERC and your sponsor before any publication of the research findings.

Please note that this approval is given for a period of 12 months, beginning 11th March, 2016 to 10th March, 2017. However, you are required to request for renewal of your study if it lasts for more than 12 months.

Please always quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED.....

PROFESSOR MOSES AIKINS
(GHS-ERC VICE-CHAIRPERSON)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra

1

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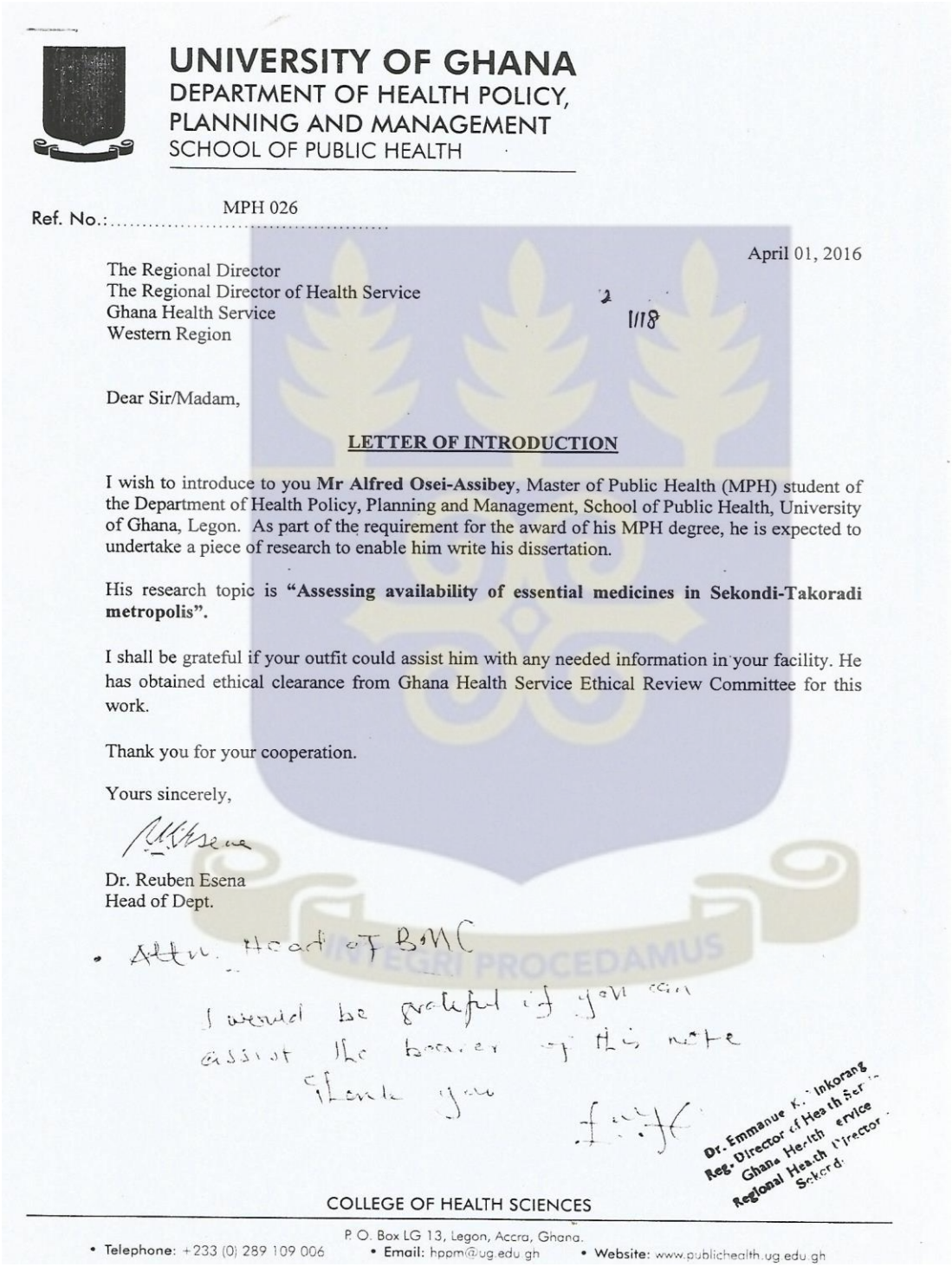
Appendix F: Introductory Letter from School of Public Health and Correspondence from Western Regional Director of Health Services.



UNIVERSITY OF GHANA
DEPARTMENT OF HEALTH POLICY, PLANNING AND MANAGEMENT
SCHOOL OF PUBLIC HEALTH

Ref. No.: MPH 026

April 01, 2016

The Regional Director
The Regional Director of Health Service
Ghana Health Service
Western Region

1118

Dear Sir/Madam,

LETTER OF INTRODUCTION

I wish to introduce to you **Mr Alfred Osei-Assibey**, Master of Public Health (MPH) student of the Department of Health Policy, Planning and Management, School of Public Health, University of Ghana, Legon. As part of the requirement for the award of his MPH degree, he is expected to undertake a piece of research to enable him write his dissertation.

His research topic is **"Assessing availability of essential medicines in Sekondi-Takoradi metropolis".**

I shall be grateful if your outfit could assist him with any needed information in your facility. He has obtained ethical clearance from Ghana Health Service Ethical Review Committee for this work.

Thank you for your cooperation.

Yours sincerely,

Dr. Reuben Esena
Head of Dept.

Attn. Head of BMC
I would be grateful if you could assist the bearer of this note
Thank you

Dr. Emmanue K. Inkoran
Reg. Director of Health Ser
Ghana Health ervice
Regional Health Director
Sekond

COLLEGE OF HEALTH SCIENCES
P. O. Box LG 13, Legon, Accra, Ghana.
• Telephone: +233 (0) 289 109 006 • Email: hppm@ug.edu.gh • Website: www.publichealth.ug.edu.gh

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Appendix G: Introductory Letter from Metropolitan Director of Health Service

In case of any reply the number
And date of this letter should be
quoted

OUR CORE VALUES

- Team work
- Professionalism
- Innovation
- Integrity
- Client centeredness
- Discipline

GHANA HEALTH SERVICE
Your Health - Our Concern

SEKONDI-TAKORADI METROPOLIS
POST OFFICE BOX 137
SEKONDI

TEL NO: 0206663467

31ST MAY, 2016

Our Ref: GHS/WR/MHD/11/14

ALL FACILITY HEADS
SEKONDI/TAKORADI METRO.
SEKONDI

LETTER OF INTRODUCTION
MR. ALFRED OSEI-ASSIBEY – MPH STUDENT

The above-named student is undertaking a research on 'Assessing availability of essential medicines in Sekondi-Takoradi Metropolis'.

It will be appreciated if you could kindly offer him the needed assistance.

Thank you.

JOYCE K. BAGINA
METRO DIR. OF HEALTH SERVICE

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