

**SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCE
UNIVERSITY OF GHANA**



**ASSESSMENT OF THE ROLE OF COMMUNITY PHARMACIES IN DIABETES
MANAGEMENT IN THE ACCRA METROPOLIS**

**BY
RUBY ANNE BIAKU
(10191822)**

**DISSERTATION SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH,
UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILMENT FOR THE AWARD
OF MASTER OF PUBLIC HEALTH (MPH) DEGREE**

JULY, 2017

DECLARATION

I, Ruby Anne Biaku, hereby declare that apart from other researchers' work that have been duly acknowledged, this thesis is my original work and it has not been presented elsewhere for another degree either in whole or in part.

.....
RUBY ANNE BIAKU
(STUDENT)

.....
DATE



.....
Dr. REUBEN ESENA
(SUPERVISOR)

.....
DATE

DEDICATION

This work is dedicated to my daughters Deborah and Angela.



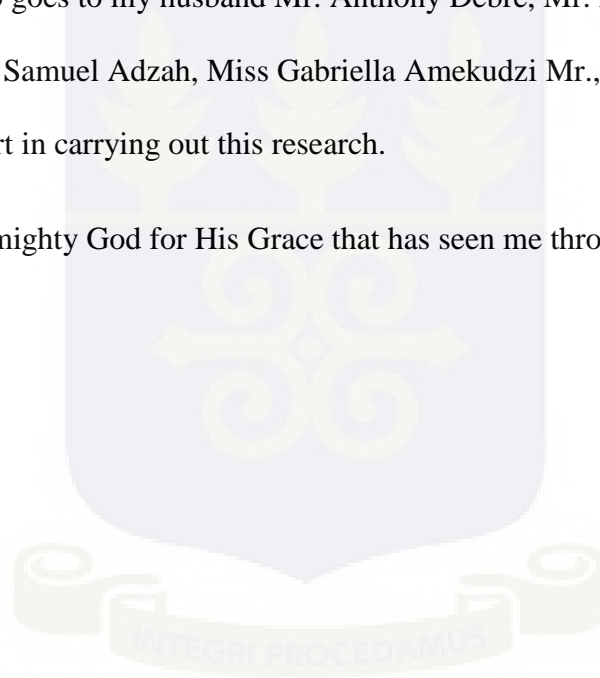
ACKNOWLEDGEMENT

I wish to extend my gratitude to my academic supervisor, Dr. Reuben Esena for his kindness, guidance, and support.

I also want to thank the Course Coordinator, Prof. Augustine Ankoma for his encouragement throughout the programmer.

My sincere gratitude also goes to my husband Mr. Anthony Debre, Mr. Bismark Agbelengor, Mr. Kofi Agyabeng, Mr. Samuel Adzah, Miss Gabriella Amekudzi Mr., James Mensah and Ms. Rita Sam for their support in carrying out this research.

Above all, I thank the almighty God for His Grace that has seen me through this course.



LIST OF ABBREVIATIONS

HbA _{1c}	Glycated Haemoglobin
FPG	Fasting Plasma Glucose
OGTT	Oral Glucose Tolerance Test
RPG	Random Plasma Glucose
BMI	Body Mass Index
NCD	Non-communicable disease
WHO	World Health Organisation
STG	Standard Treatment Guideline
IDF	International Diabetes Federation
NHIA	National Health Insurance Authority
EML	Essential Medicines List 2010
DORA	Diabetes online Risk Assessment

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENT	iii
LIST OF ABBREVIATIONS.....	iv
LIST OF FIGURES	viii
ABSTRACT.....	x
CHAPTER ONE	1
INTRODUCTION	1
1.1 Background	1
1.2 Problem Statement	3
1.3 Significance of the study.....	4
1.4 Research Question.....	5
1.4.1 Specific Questions	5
1.5 General Objective.....	5
1.5.1 Specific Objectives	5
CHAPTER TWO	6
LITERATURE REVIEW	6
2.1 The Burden of diabetes	6
2.2 Effects of Diabetes	6
2.3 Clinical Manifestation of Diabetes.....	7
2.4 Prevention of Diabetes.	8
2.5 Diabetes Management	9
2.5.1 Early Detection and Diagnosis of Diabetes	10
2.5.2 Treatment.....	11
2.5.2.1 Promotion of Healthy lifestyle	12
2.5.2.2 Anti-diabetic Drugs for Blood Glucose Control.....	12
2.5.2.3 Blood Glucose Monitoring	14
2.5.2.4 Self-care Education and Support	14
2.5.3 Early Detection and Management of Complications.....	14
2.6 Diabetes Management Services in Low Resourced Primary Health-Care Setting	15
2.6.1 Supply of Anti-diabetic Drugs.....	16

2.6.2 Supply of Self-care Devices and Accessories	19
2.6.3 Blood Glucose Measurement.....	21
2.6.4 Blood Pressure Measurement	21
2.6.5 Testing for Protein in the Urine	22
2.6.6 Weight and Height Measurement	22
2.6.7 Counselling On the Use of Medicines.....	23
2.6.8 Education on Lifestyle Management.....	23
2.6.8 Keeping of Patient Records	24
2.6.9 Screening for High Risk Individuals	24
2.7 Availability of Diabetes Management Services in Low Resourced Primary Health-Care Setting.....	25
2.8 Community Pharmacies in Ghana.....	26
2.8.1 Characteristics of Community Pharmacies in Ghana	26
2.8.2 Functions of Community Pharmacies in Ghana	27
2.9 Community Pharmacy Diabetes Management Services	28
CHAPTER THREE	32
RESEARCH METHODOLOGY.....	32
3.1 Study Area.....	32
3.2 Study designs.....	33
3.3 Study Variables	33
3.4 Study Population	34
3.4.1 Selection of Essential Drugs.....	34
3.5 Sample size.....	34
3.6 Sampling Method	34
3.7 Data Sources.....	35
3.8 Data Collection Technique.....	35
3.9 Quality Control.....	36
3.10 Data Processing and analysis	36
3.12 Ethical Consideration	37
CHAPTER FOUR.....	38
RESULTS	38
4.1 Results on Background Characteristics of Community Pharmacies Surveyed.....	38
4.3 Availability of Anti-Diabetes Drugs, Self-care Devices and Monitoring Services.	41

4.3 .1 Availability of Anti-Diabetic Drugs in Community Pharmacies	41
4.3.2 Availability of Self-care Devices in Community Pharmacies.....	42
4.3.3 Availability of Monitoring Services in Community Pharmacies.	43
4.4 Challenges to Diabetes Management in Community Pharmacies	44
4.5 Association between Background Characteristics of Pharmacies and Availability of Insulin.....	45
4.6 Association between Background Characteristics of Pharmacies and Availability Blood Glucose Monitoring Service.	48
CHAPTER FIVE	51
DISCUSSION.....	51
5.1 Community Pharmacy Diabetes Management Services	51
5.2 Availability of Anti-Diabetic Drugs, Self-care Devices and Monitoring Services.....	52
5.2.1 Availability of Anti-Diabetic Drugs.....	52
5.2.2 Availability of Self- care Devices and Accessories.....	53
5.2.3 Availability of Monitoring Services.....	54
5.3 Challenges to Diabetes Management in Community Pharmacies	55
5.4 Limitation of study.....	55
CHAPTER SIX.....	57
CONCLUSION AND RECOMMENDATION.....	57
6.1 CONCLUSION	57
6.2 RECOMMENDATION	58
REFERENCES	59
APPENDICES	61
APPENDIX 1: Informed Consent.....	61
APPENDIX 2: Questionnaire on Assessment of the Role of Community Pharmacies in Diabetes Management in the Accra Metropolis.....	63

LIST OF FIGURES

Figure 1: Availability of Anti-diabetic Drugs in Community Pharmacies 41

Figure 2: Availability of Self-care Devices and Accessories 42

Figure 3: Availability of Monitoring Services..... 43

Figure 4: Challenges to Diabetes Management in Community Pharmacies..... 44



LIST OF TABLES

Table 1: Background Characteristics of Community Pharmacies Surveyed	39
Table 2: Community Pharmacy Diabetes Management Services	40
Table 3: Association between Background Characteristics of Pharmacies and Availability of Insulin.	46
Table 4: Association between Background Characteristics of Pharmacies and Availability of Blood Glucose Monitoring Services.	49



ABSTRACT

Some of the major challenges to diabetes management in Ghana are the availability of services and products for management at the primary health-care level. Community pharmacies belong to the private health sector, they operate at the primary health-care level and their functions and accessibility are critical in the management of diabetes.

This study therefore sought to determine the range of services that community pharmacies provide in diabetes management, assess the availability of anti-diabetic drugs, self-care devices and monitoring services in these pharmacies and to identify the challenges to diabetes management in community pharmacies. This could serve as a basis for exploring the possibility of better engaging them in addressing some of the challenges to diabetes management.

Using a quantitative approach, this cross-sectional study selected 329 community pharmacies in the Accra Metropolis by simple random sampling and an interviewer-administered questionnaire was used to collect data from these pharmacies. Data was analyzed using STATA software version 14.

The most important services community pharmacies in the Accra Metropolis provide are supply of anti-diabetic drugs (99.39%) and counselling on the use of drugs (91.77%). The availability of Metformin (98.48%) and Glibenclamide (94.83%) exceed the WHO benchmark of 80% whilst the availability of insulin (29.4%) was far below. The study concludes that community pharmacies play a very significant role in the supply of anti-diabetic drugs for the management of diabetes and recommends policy change and support for these pharmacies to play more significant roles in the diagnosis of the disease and early detection of complications associated with it.

CHAPTER ONE

INTRODUCTION

1.1 Background

Diabetes Mellitus (Diabetes) is a serious chronic disease that occurs either when the pancreas does not produce enough insulin (a hormone that regulates blood glucose), or when the body cannot effectively use the insulin it produces (WHO, 2016).

It is usually characterized by raised blood glucose levels and, if not properly managed, is associated with high levels of morbidity and mortality. It is estimated that, compared to people without diabetes, people with diabetes have 10 times the incidence of end stage renal disease, 10 to 20 times the rate of amputation and 2 to 3 times higher rates of cardiovascular events (WHO, 2016). In 2015, diabetes accounted for 5 million deaths globally, 321,000 deaths in Africa and 4,790 adult deaths in Ghana.

It is also on the increase with prevalence doubling in Africa between 1980 (3.5%) and 2014 (7.1%). In 2015, the global estimate for diabetes cases was 415 million, and Africa accounted for 14 million of those cases. In the same year, Ghana had 266,200 cases with an estimated 189,900 undiagnosed cases (Idf, 2005; WHO, 2016).

Diabetes is a major source of financial burden on individuals, families, communities and nations at large. In 2015, global expenditure on diabetes was estimated at US\$ 673 billion constituting 12% of the global health budget and in Africa and Ghana, average expenditure per person within the same year was estimated at US\$243 and US\$180 respectively (“Idf DA, 2015 7Th Edition,” 2015).

The public health burden of this disease has necessitated its inclusion among the non-communicable diseases targeted for action under the United Nations 2030 Agenda for Sustainable Development in which premature mortality from non-communicable diseases including diabetes is to be reduced by a third by the year 2030. To achieve this, there is the need to actively involve the private health sector especially in low and middle income countries where resources are limited (Donoghue, States, & Representatives, 2015).

In Ghana, the private health sector is diverse and large in terms of resources and services. It plays a very important role in health delivery with people seeking health opting for services from this sector at least half the time (Barnes et al., 2010). Optimizing and directing the resources in this sector towards achieving the goals set for diabetes management therefore would be a very important step towards the attainment of these goals.

A very important group of service providers in the private health sector is the Community Pharmacies. They constitute a huge resource base within this sector with over 2000 of them distributed across the nation and employing over 2000 Pharmacist as well as other health professionals. In terms of numbers, they constitute the largest group of private health institutions operating (by law) with health professionals.

The core business of community pharmacies is the supply of medicines and related information. In addition, they manage simple ailments of common occurrence and engage in health promotion activities.

Community Pharmacies operate generally for very long hours and are available for provision of services without prior appointments or payment of consultation fees and are located mostly in the heart of the communities that they serve.

The convenience of their locations and the range of services they render make them very good candidates for the management of chronic diseases and as such diabetes.

1.2 Problem Statement

As part of the 2030 Agenda for Sustainable Development, Ghana, together with the other member countries of the United Nations, set a target to reduce premature mortality from non-communicable disease including diabetes by one third (Donughue et al., 2015).

One of the major threats to the attainment of this goal in low and middle income countries (Ghana) is the inadequate availability of services and products for the management of diabetes at the primary care level (WHO, 2016).

In Africa, general availability of anti-diabetic drugs (sulphonylureas, metformin and insulin) in the public sector was reported in only 23%, 51% and 40% of countries respectively (Bettcher, n.d.).

According to the IDF Global Score Card for diabetes 2015, services for prevention, early diagnosis, prevention of secondary complication and self-management education are provided with limited availability in Ghana. A research conducted in Ghana, showed an increase in prevalence of diabetes, but resources for managing it remain inadequate. For example, the availability of health professionals, drugs and equipment for managing diabetes were found to be inadequate (Darkwa, 2011).

In order to improve Ghana's chances of meeting the targets set for diabetes therefore, it is important to scale up the availability of the diabetes services and products by mobilizing and orienting resources from both the public and private health sectors (Donughue et al., 2015). This requires a good understanding of what the situation is and also what challenges there are to the supply of these services and products by the various sectors.

A lot of work has been done on the role that the public sector plays in relation to the supply of these services and products for diabetes management. Although community pharmacies, form a very large component of the private health sector, not much is documented about their roles in the management of diabetes in Ghana.

The purpose is to provide information for policy decisions on strategies to improve availability of diabetes management services in primary health-care setting.

1.3 Significance of the study

A major challenge in diabetes management in Ghana is related to the availability of services, medicines and products for the management of the condition at primary health-care level.

Community pharmacies, if properly engaged, can serve as part of the solution to this challenge. To be able to engage them however, there is the need to understand the role they play currently and the challenges that are encountered in managing diabetes in these pharmacies.

This study therefore seeks to explore the range of services that community pharmacies provide in diabetes management, availability of anti-diabetic drugs, self-care devices and monitoring services as well as identify the challenges to diabetes management in these pharmacies.

The findings of this study would provide policy makers with information on the role community pharmacies play in the provision of services and products for diabetes management. It will further clarify how the role can be improved in order to improve the nation's chances of meeting the targets set for diabetes management.

It would also serve as a source of information to diabetes patients and the general public on the type of services and products that are available in community pharmacies for diabetes management. Finally it would add to knowledge in the field of research in diabetes management.

1.4 Research Question

What role do community pharmacies play in the management of diabetes?

1.4.1 Specific Questions

1. What services do community pharmacies provide in diabetes management?
2. What is the extent of availability of anti-diabetic drugs, self-care devices and monitoring services in community pharmacies?
3. What challenges do community pharmacies face in providing diabetes management services?

1.5 General Objective

To assess the role community pharmacies play in the management of diabetes in the Accra Metropolis.

1.5.1 Specific Objectives

1. To determine the range of services community pharmacies provide in diabetes management.
2. To assess the availability of anti-diabetic drugs, self-care devices and monitoring services in community pharmacies.
3. To identify the challenges community pharmacies face in providing diabetes management services.

CHAPTER TWO

LITERATURE REVIEW

2.1 The Burden of diabetes

Diabetes is a major public health burden globally. In 2014, the number of people estimated to be living with the disease globally was 422million and prevalence among adults was estimated to be 8.5% (WHO, 2016). Global expenditure on the disease in 2015 was 673 billion dollar representing 12% of the global budget on health and the number of deaths due to diabetes in the same year was estimated to be 5million (IDF, 2015). Prevalence of the disease is on the rise globally and with the current trends, it is estimated that by 2040 one in ten adults worldwide would have the disease (Idf, 2015).

An estimated 14 million people were living with diabetes in Africa in 2015(IDF, 2015) and prevalence is rising faster than the average global increase (WHO, 2016).

In Ghana, the estimated number of adults (aged 20-79) with diabetes in 2015 was 266,200 translating into a prevalence of 1.9%. The prevalence appears to be low compared to the global average because of the relatively high number of undiagnosed cases, 189,900 representing 67% of cases. In the Cape Coast metropolis of Ghana, analysis of data from three major hospitals showed that prevalence of diabetes among people visiting these hospitals had increased from 19.3% in 2005 to 22.3% in 2009 (Darkwa, 2011).

2.2 Effects of Diabetes

Diabetes is a major cause of mortality and morbidity if it is not managed well. It is estimated that, compared to people without diabetes, people with diabetes have 10 times the incidence

of end stage renal disease, 10 to 20 times the rate of amputation and 2 to 3 times higher rates of cardiovascular events (WHO, 2016)

It is also a major financial burden, not only to the individuals but also families, health systems and nations at large. In 2009, the mean financial cost of managing one diabetic patient in four cocoa clinics in Ghana was US\$372.65 and 8% of the total expenditure of these clinics in the same year was spent on managing diabetes (Quaye, Amporful, Akweongo, & Aikins, 2015).

Diabetes also has social and psychological effects on patients and the society in general. Patients have to adhere to strict regimen such as taking of medicines, eating on time, regular exercise schedules and checking of blood glucose. These activities tend to be challenging to the individual patients as well as people their care-givers. The impact on the mental health of individuals is also profound. The thought of having a condition that would not go away and the possibility of complications and death is a source of stress to most diabetes patients. In a cross sectional study conducted in eight primary care clinics in Malaysia, diabetic patients were found to have a higher prevalence of depression, anxiety and stress compared to the general population (Tan et al., 2015).

2.3 Clinical Manifestation of Diabetes

Diabetes is a group of metabolic diseases characterized by hyperglycaemia resulting from defects in insulin secretion, action or both (ADA, 2014). It may be classified as type 1 if there is deficiency in insulin secretion by the pancreas or type 2, if there is a deficiency in the ability to of the body to utilize insulin with or without a deficiency in insulin secretion. Gestational diabetes is the development of diabetes during pregnancy in previously non-diabetic people (Ada, 2014; WHO, 2016)

Some of the symptoms associated with it are excessive urination, thirst, constant hunger, weight loss, vision changes and fatigue.

The predisposing factors for Type 2 diabetes may be a combination of genetic and metabolic factors, some of these factors are ethnicity, old age, obesity, family history, unhealthy diets, physical inactivity and smoking. History of gestational diabetes may also be a factor.

Diagnosis of diabetes is done based on the amount of glucose in the blood and the parameters used in assessing this are fasting Plasma glucose (FPG), 75g oral glucose tolerance test (OGTT)-2hour Plasma glucose, glycated haemoglobin (HbA_{1c}) and random plasma glucose (RPG) (Idf, 2014).

There are various standards for diagnosis and whilst the WHO standard for diagnosing diabetes is a FPG of $> 7\text{mmol/L}$ the Ghana standard treatment guideline, 2010 sets the reference level at FPG of $\geq 5.7\text{mmol/L}$.

2.4 Prevention of Diabetes.

Diet and improved physical activity have been known to prevent or delay the onset of type 2 diabetes. At the individual level, prevention involves interventions to improve diet and physical activity and at the national level it involves reducing the prevalence of modifiable diabetes risk factors such as overweight, obesity, physical activity and unhealthy diet in the general population.

In Cuba, between 1980-2010, it was observed that a rapid decline in diabetes and heart disease accompanied an average population wide weight loss of 5.5kg and a subsequent rebound in population wide weight was followed by 116% in diabetes prevalence (Franco, Bilal, Benet, Kennelly, & Cooper, 2013)

2.5 Diabetes Management

Diabetes is a chronic and progressive disease however, good management can help people with the condition live long and relatively healthy lives. The aim of management therefore is to improve quality of life, prevent complications and reduce mortality (WHO, 2016).

Good diabetes management involves providing a range of services that cut across from early diagnosis of the disease and its treatment to prevention, early identification and management of the complications associated with it. It also involves promoting patient self-care and having standard protocols for referral from one level of care to the other. In areas where there are high levels of undiagnosed diabetes and where resources are available for detection programmes as well as treatment of cases detected, screening for early detection may also be considered a part of good management (WHO, 2016; IDF, 2014).

The WHO recommends that national guidelines and protocols for diabetes management, should have the following components; interventions to promote the support of healthy lifestyle, medications for blood glucose control, medication to control cardiovascular disease, regular examination for early detection of complications and standard criteria for referral from primary care to other levels of care and these should be adapted to the various settings in which management takes place (WHO, 2016)

Whilst most treatment and tests involved in diabetes management can be done at the primary care level, periodic referral to higher levels of care may be required for the management in some cases. For instance, whilst diagnosis and management of uncomplicated diabetes may take place at primary care level, comprehensive eye examinations, management of complications such as kidney failure, acute cardiovascular disease and foot ulcers may have to be managed at higher levels of care (WHO, 2016).

2.5.1 Early Detection and Diagnosis of Diabetes

Diabetes is a disease with a relatively long asymptomatic phase and therefore may remain undiagnosed for a relatively long time. In 2015, it was estimated that globally, about half of the people with diabetes (192.8 million people) were unaware of their condition and in Africa, including Ghana, 66.7% of people (9.5million) were undiagnosed (“Idf Diabetes Atlas 2015 7Th Edition,” 2015).

The longer a person lives with the undiagnosed and untreated diabetes, the worse the health outcomes are likely to be (WHO, 2016). The time of initiation of treatment has been found to be more important than the intensity of treatment after diagnosis (Herman et al., 2015).

Early detection and diagnosis of diabetes are therefore very important parts of diabetes management and have been shown to be associated with better treatment outcomes.

A decision to screen for early detection of diabetes is usually taken based on the prevalence of undiagnosed diabetes in an area, the availability of resources to conduct the detection programme as well as treating those whose conditions are detected and diagnosed through this process (WHO, 2016; IDF 2014)

There are various parameters used in the diagnosis of diabetes, these are plasma glucose levels, glycated haemoglobin levels (HbA_{1c}) and in rare cases the presence of glucose in the urine (IDF, 2014).

Plasma glucose levels may be measured after an overnight fast as fasting plasma glucose (FPG) or 2 hours after a 75g oral glucose load known as oral glucose tolerance test (OGTT) or at any time of the day known as the random plasma glucose (IDF,2014). The glucose levels may be measured in the laboratory as venous plasma glucose (the preferred method) or by point-of-care devices that measure capillary plasma glucose levels (Glucometers) (WHO, 2016).

Glycated haemoglobin (HbA_{1c}) is a measure of the average blood glucose levels over the past few weeks. Determining (HbA_{1c}) is a relatively expensive and sophisticated test and may be used only when there is an assurance that there are no conditions present to preclude its accurate measurement (IDF, 2014).

The presence of glucose in the urine may also be used in very limited resource settings for diagnosis (IDF, 2014).

Various standards exist for the diagnoses of diabetes. The WHO standard for diagnosing diabetes is as follow: FPG ≥ 7.0 mmol/l (126mg/dl) or 75 GOTT with FPG ≥ 7.0 mmol/l (200mg/dl) and/or a 2 hour plasma glucose ≥ 11.1 mmol/l (200mg/dl) or HbA_{1c} $\geq 6.5\%$ /48mmol/mol.

The Ghana standard treatment guideline, 2010 sets the reference level at FPG ≥ 5.7 mmol/L and/ or random glucose 2 hours after a meal or 75g glucose load ≥ 7.8 mmol/L or more.

Screening and blood glucose measurement are services required to achieve these (IDF, 2014).

2.5.2 Treatment

The aim of treatment is to ensure tight blood glucose control within normal levels as far as possible and to delay or prevent the development of complications (IDF, 2014).

The main components of treatment once diagnosis has been done are: interventions to promote healthy lifestyle, medication and monitoring for tight blood glucose control, self-care education and support and prevention, early detection and management of complications (IDF, 2011).

2.5.2.1 Promotion of Healthy lifestyle

Interventions to promote healthy lifestyle is the first step in the effort to achieve blood glucose control and it cuts across all stages of diabetes treatment. This intervention seeks to address the metabolic factors associated with diabetes. It involves educating people living with diabetes on various aspects of their life, such as, diet, physical activity, alcohol and tobacco use (IDF, 2011). Taking in more of low calorie foods and reducing the amount of food taken if overweight are important components of the dietary manage Intake of dietary fiber and replacement of saturated fats with unsaturated ones have also been found to be useful (WHO, 2014). Avoidance of sugars, tobacco and harmful use of alcohol is also important in lifestyle management (Leh et al, 2014).

Regular Physical exercise appropriate to each individual condition is also encouraged. This has been shown to be associated among others with good blood glucose control and a reduction in cardiovascular risk (Hayes et al, 2013).

Services required for the promotion of healthy lifestyle are education and supply of products that assist in lifestyle management (IDF, 2014).

2.5.2.2 Anti-diabetic Drugs for Blood Glucose Control

When lifestyle modification alone fails to achieve blood glucose control, anti-diabetic drugs may be used. Anti-diabetic drugs play a very important and central role in diabetes management. In a study by the UK Prospective group, it was observed that, a significant reduction in complication and mortality was observed in patients on medication with tight blood glucose control compared to those who were only on diet.

These drugs can be broadly classified into two groups; oral anti-diabetic drugs and insulin.

The oral anti-diabetic drugs are mainly used in controlling blood glucose levels of people with type 2 diabetes. There are various classes of these drugs and these include biguanides (metformin), sulphonylureas, α -glucosidase inhibitors, DPP-4 inhibitors and thiazolidinedione (IDF, 2014)

There are various guidelines on ways in which these oral agents can be used or combined to manage blood glucose levels. The WHO guideline provides that metformin be used as the first line agent for blood glucose control in type 2 diabetes and where the use of metformin is contraindicated, a sulphonylurea or alpha-glucosidase inhibitors may be used. The second line therapy involves adding any of the following oral agents to the first line drug used; metformin, a sulphonylurea, and α -glucosidase inhibitor or a dipeptidyl peptidase 4 (DPP-4) inhibitor or thiazolidinedione. The third line involves the addition of a third oral hypoglycaemic agent or insulin.

The Ghana Standard Treatment Guideline (STG, 2010) which is the officially approved guideline for prescribers and dispensers at all levels in Ghana provides that, if clients fail to achieve satisfactory blood glucose control in three months through lifestyle management, the following classes of medicines may be used either individually or combined in the following order; metformin, sulphonylureas or thiazolidinediones or a combination of these.

Insulins are very important in blood glucose control in diabetes treatment since people with Type1 diabetes depend on it for management of their condition and survival. It is also used in the management of people with type 2 diabetes, where oral agents are either ineffective or unsuitable (IDF, 2014)

2.5.2.3 Blood Glucose Monitoring

The aim of monitoring blood glucose during treatment is to ensure that blood glucose levels are kept within normal ranges as far as possible, this is vital in improving the chances of achieving favorable treatment outcomes. Monitoring provides a guide for the selection and adjustment of dosage of medication during treatment and management of diet and physical activity (IDF, 2014).

The parameters used to determine blood glucose levels are glycated haemoglobin levels (HbA_{1c}) or blood glucose (measured as plasma or capillary blood glucose levels). A less expensive alternative is checking for glucose in the urine which may be an indication of high levels of glucose in the blood ((IDF, 2014)

2.5.2.4 Self-care Education and Support

Self-care in diabetes is the daily activities that diabetic patients perform to manage the disease. It is very important in diabetes management because good self-care has been shown to be positively related to good blood glucose control, reduction in complications and improvement in quality of life (Shrivastava et al., 2013) .

Promotion of self-care requires education and the supply of devices. Some of the devices needed are blood glucose monitors for ensuring tight blood glucose control, syringes and insulin pens for the administration of insulin, blood pressure monitors for checking blood pressure, and weighing scales for weight management.

2.5.3 Early Detection and Management of Complications

Diabetes is associated with very serious and life threatening complications if not well controlled. Some of these complications lead to amputations, blindness and kidney failure (WHO, 2016).

It is estimated that the incidence of cardiovascular disease in adults with diabetes is two to three times higher than in their counterparts without diabetes. The incidence of end-stage renal disease is up to 10 times as high in adults with diabetes compared to those without (WHO, 2016).

Early detection and interventions however slow down the progression of these complications. Routine monitoring of blood pressure, screening for signs of poor circulation, testing of urine for the presence of proteins and eye tests are some of the services required for detecting the onset of complications (IDF, 2014).

2.6 Diabetes Management Services in Low Resourced Primary Health-Care Setting

The setting in which diabetes management is carried out impacts the type and availability of diabetes management services. The level of development of a nation in which a facility is located as well as the level of care are among the factors that define the settings (WHO, 2015).

The World Health Organisation recognises the high resourced settings of the high and upper-middle income countries and the low resource setting of the low and lower-middle income countries such as those in Africa (WHO, 2015) and this has been found to influence the availability of diabetes management services. In 2015, whilst 90% of countries in the WHO high-income region reported general availability of insulin in publicly funded pharmacies in primary health-care facilities, only 23% of countries in the low income region reported the same (WHO, 2015).

Also, several levels of care are recognised in the health sector; there is the primary health care level which is the lowest level of care and the first point of contact with the healthcare professional as well as higher levels of care that have specialist services (WHO, 2010).

Primary care facilities in low resource settings are faced with various constraints such as lack of resources, inadequate skills, inadequate coverage of health financing schemes, unavailability of complex technologies, and competing needs making it difficult to integrate all interventions in diabetes management at this level (WHO, 2014). Outcomes in diabetes management at this level have however been known to improve with basic interventions including, medication, health education, counselling and consistent follow ups ((WHO, 2016).

In order to improve the chances of attaining universal health coverage therefore, the World Health Organisation in its package of essential non-communicable interventions for primary healthcare in low resource settings recommends a core list of essential medicines, basic technologies and tools for providing diabetes management services at this level. These provide for cost effective interventions and require very basic skills (WHO, 2014).

The anti-diabetic drugs included in the core list of essential medicines are metformin, glibenclamide and insulin. The recommended technologies include, technologies for blood pressure measurement, glucometer, glucometer test strips, weighing machine, measuring tape and urine protein test strips WHO, 2014).

2.6.1 Supply of Anti-diabetic Drugs

The WHO recommended list of essential medicines for the management of non-communicable disease in low resource primary care settings includes metformin, glibenclamide and insulin for blood glucose control. For facilities at this level with non-physician health workers, these drugs are usually supplied based on prescriptions from a higher level where physicians are present (WHO, 2014). These anti-diabetic drugs are also listed in the standard treatment guidelines of Ghana and the Ghana essential medicines list for the management of diabetes.

The anti-diabetic drugs metformin, and glibenclamide are oral anti-diabetic agents, used mainly in the management of people with type 2 diabetes whilst insulin is a parenteral preparation used in the management of people with type1 diabetes and in some cases for people with type 2 diabetes where the orals agents are either not effective or not suitable.

2.6.4.1 Metformin

Metformin is an oral anti-diabetic agent and is a biguanide. It is considered the first line treatment for people with type 2 diabetes and may sometimes be combined with other medications for blood glucose control (IDF, 2014).

It exerts its effect by decreasing hepatic glucose production, decreases intestinal absorption of glucose and improves insulin sensitivity by increasing peripheral glucose uptake (JFC, 2013).

There are various brands of metformin licenced for use in Ghana and these include, glucophage, metformin-denk etc.

2.6.4.2 Glibenclamide

Glibenclamide belongs to a group of oral anti-diabetic agents referred to as sulphonyureas.

Glibenclamide is recommended for use as a second line treatment for people with type2 diabetes but may be used as first line treatment where metformin is not suitable. It may be used alone or in combination with other anti-diabetic drugs (IDF, 2014; MSH, 2001).

Glibenclamide lowers blood glucose levels by stimulating the secretion of endogenous insulin from the pancreatic beta cells (JFC, 2013).

There are various brands of glibenclamide registered in Ghana and these includes daonil, glibenil and clamide.

2.6.4.3 Pioglitazone

Pioglitazone belongs to the group of anti-diabetic agents known as thiazolidinediones. It reduces peripheral insulin resistance leading to a reduction in blood glucose concentration (JFC, 2013). It is a second line treatment for diabetes and may be used in combination with other oral agents to achieve optimum blood glucose control (IDF, 2014).

It is one of the agents recommended for the management of diabetes in Ghana and is listed in the essential medicines list of Ghana but it is not listed among the core list of drugs recommended by the WHO for use in low resourced primary care setting (MSH, 2001, PEN).

2.6.4.4 Insulin

Insulin is used in the treatment of type 1 diabetes and in type 2 diabetes where other methods of blood glucose control have failed to achieve the desired result. It is also used in special cases such as diabetes ketoacidosis, pregnancy, breast feeding, acute myocardial infarction and surgical cases (IDF, 2014)

There are various types of insulin depending on the source, duration of action and composition. Based on the onset and duration of action, they may be classified as short, intermediate or long acting and this affects the frequency of administration and when they are used. The short acting insulins have a rapid onset of action usually between 30 minutes and one hour after a subcutaneous injection and may last for up to 8 hours. They are very useful in diabetic emergencies such as ketoacidosis and in time of surgery. Examples of short acting insulins are insulin aspart and insulin lispro (JFC, 2013). Intermediate and long acting insulins have an onset of action of approximately 1-2 hours when given by subcutaneous injection and their effect may last for 16-35 hours. Examples of intermediate and long actin

insulins are isophane insulin, protamine zinc insulin, insulin glargine and insulin detemir (JFC, 2013)

Proprietary pre-mixed insulin preparations are also available, they are mixed to achieve preferred onset and duration of action. Examples are humalog and insulatard (JFC, 2013).

Examples of Insulin listed in the essential medicines list of Ghana are Insulin detemir 100units/ml, insulin glargine 100units/ml, Insulin lispro 100units/ml, insulin pre-mixed, insulin soluble HM and isophane insulin (GNDP, 2010).

2.6.2 Supply of Self-care Devices and Accessories

Basic technologies recommended at primary care level for the management of diabetes include technologies for blood pressure measurement, glucometer, glucometer test strips, weighing machine, measuring tape and urine protein test strips and ketone test strips. The operation of these devices require very basic skills and are easy to use (WHO, 2014). These devices can also be used by people with diabetes for self-management when trained.

2.6.2.1 Glucometer and Glucometer Strips

The Glucometer is a medical device for measuring blood glucose levels. It is used by people with diabetes to self-monitor blood glucose levels to ensure that targets are being met. It is especially important for people with type 1 diabetes for self-monitoring since this guides them in adjusting the dose of insulin they self-administer (IDF, 2014).

The glucometer strip is a disposable accessory for the glucometer. A drop of blood obtained by pricking the skin with a lancet is placed on the disposable test strip that the meter reads and uses to calculate the blood glucose levels. Lancets are also disposable accessories used during blood glucose measurements with glucometers. They are used to prick the skin for blood samples to be taken (IDF, 2014).

There are various brands of glucometers in Ghana and these include one touch select, one touch ultra, accu check

2.6.2.2 Blood Pressure Monitor

Blood pressure measurement devices are used to measure the blood pressure of individuals.

Blood pressure measurement is important in diabetes management because it helps in the early detection and monitoring of cardiovascular complications which are relatively common in people with diabetes (WHO, 2016).

People with diabetes may self- monitor their blood pressure using a blood pressure monitor.

There are various types of blood pressure measurement devices: manual and digital devices.

Any blood pressure device used must be one that is validated, in a good working condition and must have a cuff that is appropriate for the individual whose blood pressure is measured (IDF, 2014).

2.6.2.3 Weighing Scales and Measuring Tapes

People with diabetes especially those who are overweight use weighing scales to monitor their weight as part of lifestyle management to ensure that they maintain their target weight. This is important in ensuring good blood glucose control (IDF, 2014).

Measuring tapes are also important for people with diabetes because they are used in the measurement of waist circumference which is a measure of obesity. It helps the diabetic to monitor his or her waist circumference in order to keep it within the target set.

2.6.2.4 Urine and Protein Test Strips

Urine protein test strips are used to test for the presence of protein in the urine which may be a sign of the onset of kidney disease (IDF, 2014). Even though these tests are done routinely

at health facilities for people with diabetes, individuals may use them to monitor their own kidney function.

2.6.2.5 Insulin Syringes and Pens.

Insulins are mainly administered subcutaneously but may also be administered through the intravenous or intramuscular routes. Devices such as insulin syringes and insulin pens are therefore necessary for administration of the drug (JFC, 2013).

People with type1 diabetes as well as some people with type 2 diabetes who depend fully on insulin need these devices for self- administration of the drug (IDF, 2014).

2.6.3 Blood Glucose Measurement

Blood glucose measurement is important in the diagnosis of diabetes and monitoring of blood glucose during treatment. Blood glucose levels may be measured as HBA_{1c}, venous or capillary plasma glucose. The presence of glucose in the urine may also be used as a proxy for blood glucose levels (IDF, 2014).

Measurement of blood glucose levels vary from a preferred laboratory measurements of venous plasma glucose levels to capillary plasma glucose levels (WHO, 2016)

In low resourced primary care settings, the recommended technology for the measurement of blood glucose is the glucometer which is a point-of-care device that measures capillary plasma glucose levels (WHO, 2014).The use of dipsticks to determine the presence of glucose in the blood is also acceptable in very remote low resource settings (IDF, 2014)

2.6.4 Blood Pressure Measurement

Blood pressure measurement is important in diabetes management because it helps in the early detection and monitoring of cardiovascular complications which are relatively common in people with diabetes (WHO, 2016).

Blood pressure measurement devices must be validated, in a good working condition and must have a cuff that is appropriate for the individual whose blood pressure is measured (IDF, 2014). There are various types of blood pressure measurement devices; manual and digital devices. The digital devices are recommended for primary health care levels where there are no physicians (WHO, 2014)

2.6.5 Testing for Protein in the Urine

Testing for albumin (protein) in the urine is one of the ways of assessing kidney function which is important in diabetes management. Testing for protein in urine may be done in the laboratory or at the site-of-care (IDF, 2014). The preferred method is the laboratory measurement.

In low resourced primary care settings however, the urine protein test strip which is a point-of-care device is recommended (WHO, 2014).

2.6.6 Weight and Height Measurement

Weight measurement, is important in diabetes management because it is one of the parameters used in assessing the risk of type 2 diabetes. It is also used in monitoring the weight of the individual during treatment to ensure that targets are met (IDF, 2014).

Waist circumference gives a measure of how obese a patient is and this is important in risk assessment. It is also important during treatment to monitor the waistline of the individual.

Height measurement is also important in determining the body mass index of patients and this is also important in risk assessment and lifestyle management.

The technologies for weight measurement in a low resource setting is a weighing scale which may be an analogue type or digital one (WHO, 2014).

2.6.7 Counselling On the Use of Medicines

Counselling on the use of medicines involves providing the patient with the necessary information to ensure safe and efficacious use of medicines. Information is provided on the medicine and what it is used for, how it should be taken, the potential side effects and expected outcomes (MSH, 2001).

Anti-diabetic drugs are life-saving drugs but could be very dangerous especially insulin if not properly used. It is therefore important to provide counselling on their usage.

Counselling on the use of anti-diabetic drugs is also important in ensuring compliance to therapy and this leads to good blood glucose control and good management outcomes.

In a study in India, an intervention group of diabetes patients who received counselling from pharmacies were found to have fewer episodes of hyperglycaemia or hypoglycaemia (Venkatesan, Devi, Parasuraman, & Sriram, 2012)

2.6.8 Education on Lifestyle Management

Interventions to promote healthy lifestyle is the first step in the effort to achieve blood glucose control and it cuts across all stages of diabetes treatment. This is done mainly through education (IDF, 2014).

This intervention seeks to address the metabolic factors associated with diabetes. It involves educating people living with diabetes on various aspects of their life, such as, diet, physical activity, alcohol and tobacco use (IDF, 2014).

Education on lifestyle management usually requires a team health-care professionals with specialist training in diabetes. These teams may not be available at primary care level in low

resource settings hence the education may be provided by an appropriately skilled individual (IDF, 2014; WHO, 2014)

2.6.8 Keeping of Patient Records

Protocols for referral of people with diabetes from one level to the other are necessary for good management of diabetes since some aspects of management may have to be done at higher levels where there are specialist services (WHO, 2016).

This requires proper record keeping.

2.6.9 Screening for High Risk Individuals

Screening for early detection of diabetes is a process of identifying high risk individuals for testing and diagnosis (IDF, 2014) People with type 1 diabetes usually present with symptoms early such as weight loss, thirst and frequent urination making it easier to suspect, test and diagnose the disease whilst people with type 2 diabetes may remain asymptomatic for relatively long periods of time and therefore not report early at a health facility for early diagnosis (ADA, 2014; WHO 2016).

The screening process involves the use of a risk assessment questionnaire to assess various risk factors such as age, family history, waist circumference, physical activity and body mass index (BMI). In some cases a risk score is generated which helps identify individuals at high risk of type 2 diabetes for testing and diagnosis (IDF, 2014).

To do screening, a risk assessment questionnaire, weighing scales, and measuring tapes may be needed to assess risk, measure body weight and determine waist circumference respectively.

A decision to screen for early detection of diabetes in a low resourced country should be strictly based on the prevalence of undiagnosed diabetes in an area, the availability of

resources to conduct the detection programme as well as treating those whose conditions are detected and diagnosed through this process (WHO, 2016; IDF 2014).

2.7 Availability of Diabetes Management Services in Low Resourced Primary Health-Care Setting

The global target for availability of basic technologies for monitoring and affordable essential medicines is 80% in public and privately funded facilities at the primary health-care level in low resource settings by the year 2025 (WHO, 2013) .

In 2015, whilst 90% of countries in the WHO high-income region reported general availability of insulin in publicly funded pharmacies in primary health-care facilities, only 23% of countries in the low income region reported the same(WHO, 2015). Insulins are relatively expensive but there are lower cost ones which are recommended for use in low resourced primary healthcare settings. Several factors affect the availability of insulin and these include reimbursement policies (WHO, 2016).

Availability of these technologies and essential medicines remain inadequate in most African countries. In a research conducted in the West region of Cameroon, availability of medicines for management of diabetes and hypertension in public pharmacies ranged from 36.4% to 59.1% in urban sites and between 9.1% and 50% in rural sites(Jingi et al., 2014).

In the Cape Coast Metropolis, Ghana, drugs and equipment for managing diabetes were found to be inadequate (Darkwa, 2011).

However in a survey of health facilities, including primary health-care facilities, in the Secondi-Takoradi Metropolis in Ghana, availability of glibenclamide was found to be 100% in publicly funded pharmacies (Asibey, 2016)

2.8 Community Pharmacies in Ghana

Ghana is a country in the western part of Africa. It is a lower middle-income country and therefore falls within the category of countries that are classified as being low resourced (WHO, 2014).

The Ghana Pharmacy Council under sections 93 and 95 of the Health Professionals Regulatory Bodies Act of 2013 (Act 857), licenses pharmacies. The council registers 5 types of pharmacies; retail only pharmacies, retail and wholesale pharmacies, wholesale only pharmacies, pharmacies within hospitals, clinics and any other facilities that require pharmacists and manufacturing and wholesale pharmacies.

The term community pharmacy is sometimes used generally to describe private retail pharmacies, wholesale pharmacies as well as pharmacies that have licenses to do both retail and wholesale from the same outlet. For the purpose of this research however, the term Community Pharmacy will be limited to private pharmacies that have retail only or retail and wholesale licenses.

2.8.1 Characteristics of Community Pharmacies in Ghana

According to the register of pharmacies from the pharmacy council, there were over 2200 community pharmacies nationwide as at the 31st of December, 2016 and 53% of these pharmacies were located in the Greater Accra region which is the regional capital of Ghana. Whilst some of these pharmacies are stand-alone units, some have several retail outlets.

As per the Pharmacy Council guidelines for the registration of pharmacies 2016, a community pharmacy can only be operated by a body corporate, whose object of business must include pharmacy business, and which has employed a pharmacist in good standing with the council. They may also recruit supporting staff.

In Ghana, There are laws governing the location of pharmacies as well as the dimensions and outlay of the premises. The distance between one community pharmacy and another, must be at least 400m in radius and the premises of retail only pharmacies must be at least 36m² and retail and wholesale facilities at least 48m². Other requirements for the premises are the presence of counselling area, main customer area, office and dispensary.

Some of these Pharmacies are located in residential areas whilst some are located in industrial areas.

In terms of diabetes management, community pharmacies in Ghana can be classified among facilities that operate at the primary care level since they serve as a first point of call for most patients. In the supply of medicines however they supply all categories of medicines including prescription only drugs and drugs used for specialist care at higher levels (GNDP, 2010).

Pharmacies worldwide are generally noted for their long hours of operation and the pharmacies in Ghana are no exception. Moving around the country one can easily observe pharmacies opened late at night, on public holidays as well as weekends.

Some pharmacies are part of special programmes that equips the to offer some special services to the public example the Diabetes On line risk assessment (DORA) project by Merck.

2.8.2 Functions of Community Pharmacies in Ghana

The Pharmacy license permits community pharmacies to supply all classes of medicines; class A- Prescription only medicines, Class B-medicines that may be dispensed by pharmacists without prescription and Class C-Over the counter medicines (GNDP, 2010,MSH, 2001). This is a very important role that they play in the health sector in Ghana.

In an assessment of the private sector of Ghana, in 2011 by the IFC, of The World Bank

Group, the availability of six drugs (clotrimazole, artemisinin combination therapy, folic acid tablets, amoxicillin and oral rehydration solution packets) in both private and Ghana health service facilities across rural and urban areas was 100% in rural retail pharmacies and ranged from 98% to 100% in urban pharmacies.

Some drugs supplied by community pharmacies are covered by the National Health Insurance Scheme as well as other private insurance schemes. For re-reimbursement for the supply of these drugs however, community pharmacies have to be accredited by the insurance authority (NHIS Act.852). These drugs include some anti-diabetic drugs such as metformin, glibenclamide and some insulins.

Also under section 105 of Act 857, Community Pharmacies are allowed to give medical and dental advice as first aid where there is an accident and also give mental and dental advice as first aid treatment for simple ailments of common occurrence where it is not reasonably practicable for the patient to consult a medical practitioner or dentist.

Community Pharmacies in Ghana are known to provide other services such as blood pressure measurement and supply of other products such as medical devices and sundry items. It is easy to walk into a pharmacy in Ghana and have ones blood pressure measured for free or for a fee.

2.9 Community Pharmacy Diabetes Management Services

Community Pharmacies are a very accessible group of health providers and people with diabetes visit these pharmacies regularly to refill their prescriptions. This offers community pharmacies a good opportunity to provide medication services and other important services for diabetes patient.

Community Pharmacy interventions in diabetes management have been shown to impact positively on the health of the patients. The improvements have reflected in lower glyated

haemoglobin levels, lower body mass indices, and reduction in blood pressure of intervention groups (Ali et al., 2012).

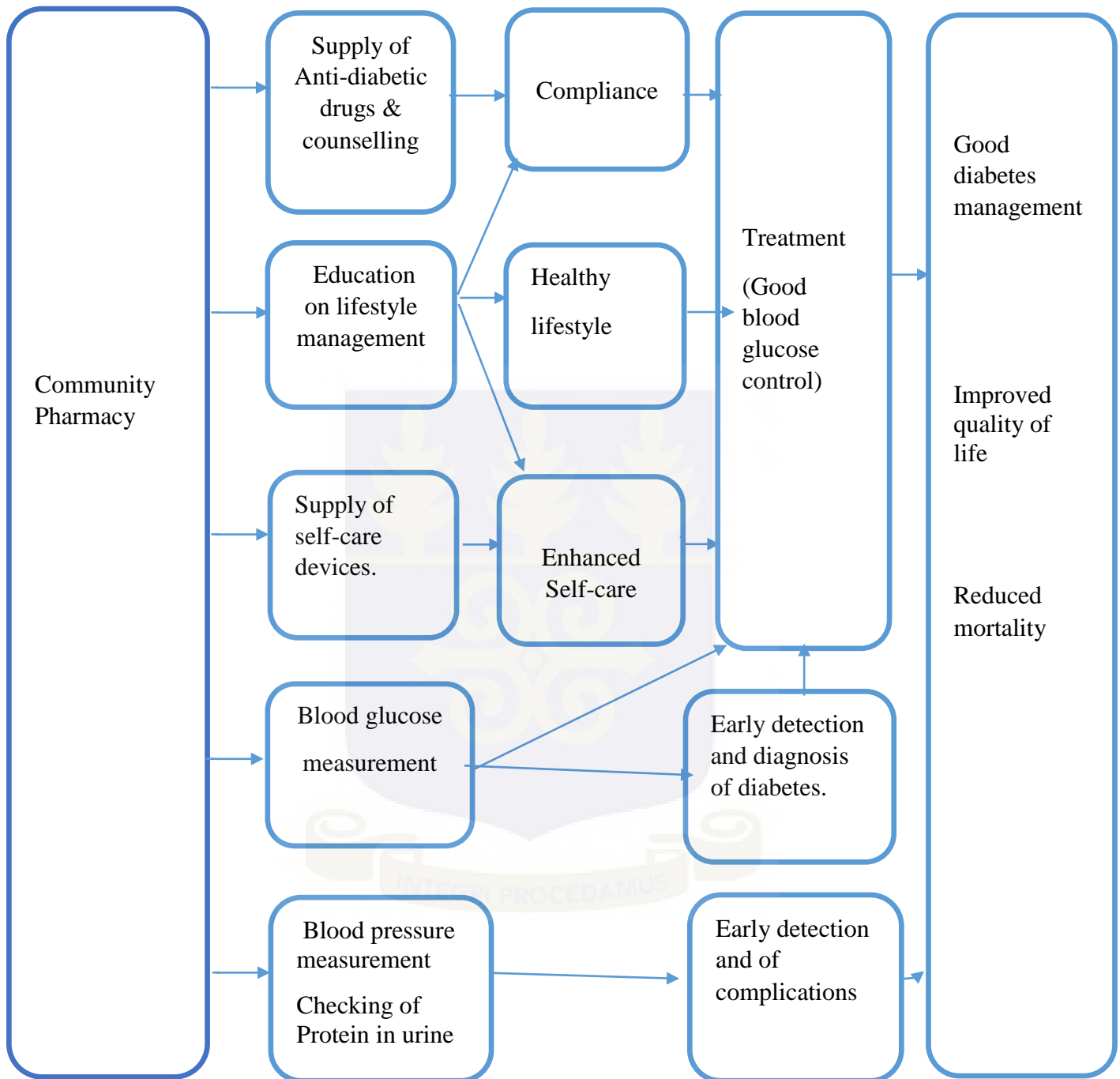
Community pharmacies are also major suppliers of diabetes medicines to patients. In Ghana, Community pharmacies are allowed to dispense all categories of drugs (that is classes A, B and C drugs) which include anti-diabetic drugs but are not allowed to prescribe them (Act 857). The supply of anti-diabetic drugs is therefore a very important role that they play in diabetes management. In a survey of 34 medicines including diabetes medicines, urban community pharmacies were found to have the highest availability of medicines (MOH, HAI, & WHO, 2008).

Another important role that community pharmacies play in diabetes management is medication interventions to ensure optimum therapy. In Kansas, USA community pharmacy medication therapy management resulted in an average saving of 102.83 USD per patient per annum (Barnes et al., 2012).

Community pharmacies are also involved in counselling and advising their patients on the disease and medicines. In a study in India, an intervention group of diabetes patients who received counselling from pharmacies were found to have fewer episodes of hyperglycaemia or hypoglycaemia (Venkatesan et al., 2012)

Some of the challenges to diabetes management in community pharmacies are time constraints, pricing of service and patient recruitment (Knapp, Ray, Law, Okamoto, & Chang, 2005).

Conceptual Framework



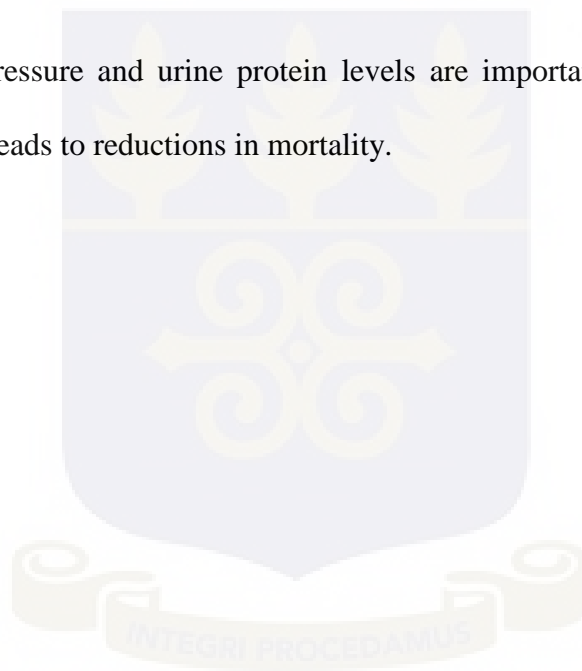
Conceptual framework for diabetes management in Community Pharmacies.

As shown in figure 1, supply of anti-diabetic drugs would enhance compliance to drug therapy in patients who are on medication hence a good blood glucose control and diabetes management.

Education on lifestyle management leads to a healthier lifestyle and an improvement in blood glucose control and diabetes management.

Supply of self-care products example glucometers, would encourage self-monitoring and good self-care. Good self-care behavior has been shown to result in good blood glucose control and good diabetes management.

Monitoring of blood pressure and urine protein levels are important in early detection of complications and this leads to reductions in mortality.



CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Study Area

The Accra Metropolitan Area (Accra Metropolis) is one of the 16 districts of the Greater Accra Region, and administratively is known as the Accra Metropolitan Assembly. Accra serves both as the capital of the Greater Accra region and the national capital.

The Accra Metropolis covers a total land area of 139.674km² and is bounded to the North by Ga West Municipal, to the West by Ga South Municipal, the South by the Gulf of Guinea and to the East by La Dadekotopong Municipal.

By the local government structure, it is divided into 10 sub-metropolitan areas as follows: Ablekuma Central, Ablekuma South, Ablekuma North, Okaikoi North, Okaikoi South and Ayawaso Central, Ayawaso West, Ayawaso East, Osu Clotey and Ashiedu Keteke.

It is the most populous district in Ghana and has a population of 1,665,086 representing about 6.7% of the total population of Ghana ((Ghana Statistical Service, 2014).

The number of registered Community Pharmacies in the Accra Metropolis (as at December, 2016) was 710. This constitutes about 31.8% of all community pharmacies in Ghana. It has some of the most sophisticated community pharmacies in Ghana and most of the chain pharmacies have at least one outlet located within this area

Prevalence of Diabetes in Ghana is 1.9% with 67% of undiagnosed cases (Idf, 2005).

The area provides a good mix of diabetes cases and community pharmacies.

3.2 Study designs

A cross-sectional study was done using a quantitative approach.

Data were collected using questionnaires which were administered by trained data collectors.

The questionnaires were administered to Pharmacists or Pharmacy managers of randomly selected pharmacies within the Accra Metropolis.

3.3 Study Variables

Dependent variables measured were diabetes management services and challenges in diabetes management.

Independent Variables were:

Type of pharmacy

Respondent

Branches

Location

Number of years in operation

Nature of business

Working days

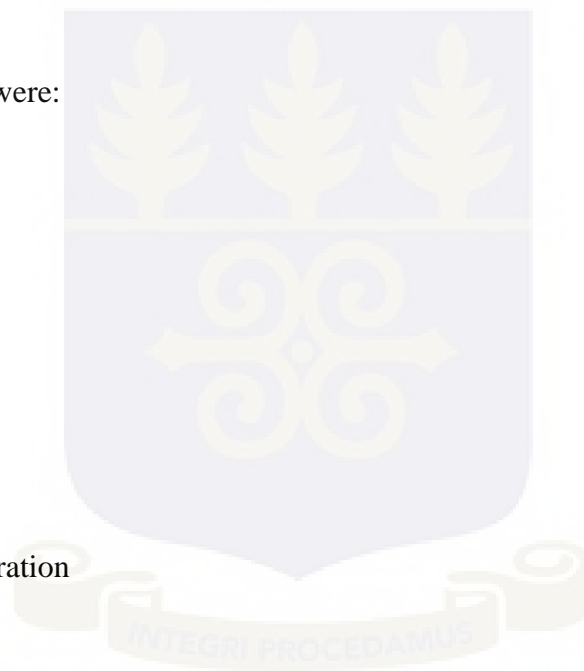
Working hours

Presence of counselling area

National Health Insurance Authority Accreditation

Membership of special diabetes program

Recruitment of other health professionals for diabetes management



3.4 Study Population

The target population was the 710 community pharmacies in the Accra Metropolitan area with either retail or retail and wholesale licenses. The category of people interviewed in these pharmacies were pharmacists on duty or the pharmacy manager on duty.

3.4.1 Selection of Essential Drugs

Three anti-diabetic drugs, metformin and glibenclamide insulin which were on the WHO core list of essential medicines as well as the essential medicines list of Ghana were selected. An additional anti-diabetic drug, pioglitazone which was on the essential medicines list of Ghana but not on the WHO also selected and surveyed.

3.5 Sample size

The sample size calculation is based on a 50% prevalence of diabetes services in community pharmacies and the Cochran's formula for categorical outcome variable $n = (z^2pq)/e^2$ with a 95% confidence level and 0.05 error level used.

The sample size was then adjusted using the finite population correction factor $n = n_1/1 + (n_1 - 1)/N$ and a non-response factor of 10%.

The final sample size obtained was 275.

3.6 Sampling Method

A random sampling technique was used to select the pharmacies. A list of 710 Community pharmacies licensed by the 31st of December, 2016 was obtained from the Pharmacy Council together with their addresses and contact details.

Numbers were assigned to each pharmacy from 1 to 710. A list of 350 random numbers between 1 and 710 were generated using a random number generator in Microsoft excel.

The 350 numbers were then linked to the respective pharmacies and these constituted the sample.

3.7 Data Sources

Data was collected from the Pharmacy Council and selected community pharmacies in the Accra Metropolis.

3.8 Data Collection Technique

Quantitative data was collected using questionnaires administered by trained data collectors.

The questionnaire consisted of four sections: Section A was designed to help collect background data on community pharmacies, Section B focused on the services provided by community pharmacies in diabetes management, Section C was for collecting data on availability of anti-diabetic medicines and devices and section D, the challenges to diabetes management in pharmacies (Appendix 1).

The pharmacist in-charge or the manager in charge at the time of the data collection was interviewed and questionnaires filled.

Availability of medicines and devices was based on sighting of a unit of the product in the facility at the time of data collection.

3.9 Quality Control

Data collectors were trained on how to administer the questionnaire to ensure validity of the data.

Also availability of the anti-diabetic medicines were determined based on the physical availability of the products at the time of administering the questionnaire and sighted by the data collector.

Each questionnaire received was be checked for completeness during the data collection process.

3.10 Data Processing and analysis

All the variables were measured as categorical outcome variables.

Data was entered into Microsoft excel 2013 and cross checked to ensure completeness and accuracy.

The data was then be transferred and analyzed using stata 14. The frequencies and percentages were determined for all the categorical variables.

A table of results were then be produced.

A cross tabulation was done between background characteristics and the outcome variables and associations determined.

A logistic regression was used to determine whether there were any significant relationships between the background characteristics and availability of insulin, self-care devices and monitoring services.

3.12 Ethical Consideration

Approval was sought from the following: Ghana Health Service Ethical Review Committee
Pharmacy Council and management of the selected Pharmacies.

Identities of the various pharmacies from which the data was collected was kept confidential so were the identity of the respondents.

There were minimal ethical issues since this study dealt with medicines and services in the community pharmacies and not human subjects.



CHAPTER FOUR

RESULTS

4.1 Results on Background Characteristics of Community Pharmacies Surveyed

Background characteristics of community pharmacies surveyed can be found in Table 1.

A total number of 329 community pharmacies were surveyed in this study, majority (N=308, 93.6%) were retail only pharmacies. Some of them (N=207, 63.7%) had been operating for more than five years and were commonly (N=213, 67.19%) situated at commercial places. A large proportion (N=280, 85.1%) of the selected pharmacies sold pharmaceuticals and sundries while the other few (N=49, 14.9%) sell pharmaceuticals only. Some (N=112, 35.6%) of the pharmacies had other retail branches with most of them operating throughout the week (N=289, 88.1%). Majority (N=304, 93%) are open for more than 12 hours a day and a few (N=15, 4.5%) operate 24 hours a day. A few of them (N=22, 6.75%) of them were accredited by the National Health Insurance Authority and some of them (N=24, 7.34%) were members of special diabetes management programmes. A relatively low proportion of pharmacies (N=81, 24.08%) had pharmacists as the respondents. Diabetes management staff in almost all (N=324, 99.7%) of the pharmacies were regular pharmacy staff.

Table 1: Background Characteristics of Community Pharmacies Surveyed

Characteristic	Outcome	Frequency	Percentage (%)
Type of License	Retail only	308	93.62
	Retail and wholesale	21	6.38
Number of Years in Operation	5 years or less	118	36.31
	Greater than 5	207	63.69
Location	Residential	104	32.81
	Commercial	213	67.19
Number of retail Outlets	One	203	64.44
	More than one	112	35.56
Nature of Business	Sale of Pharmaceuticals only	49	14.89
	Sale of Pharmaceuticals sundry	280	85.11
Number of Working Days in a week	Less than 7Days	73	22.32
	7 Days	254	77.68
Daily Working Hours	Less than 12 hours	24	7.32
	12 to 24hours	289	88.11
	24Hours	15	4.57
Accreditation by National Health Insurance Scheme	Yes	22	6.75
	No	304	93.25
Membership of special Diabetes Management Programme	Yes	24	7.34
	No	303	92.66
Respondent	Pharmacist	81	25.08
	Others	242	74.92
Diabetes Management Staff	Regular Pharmacy staff only	324	99.70
	Other Professionals	1	0.30
Presence of Dedicated Counseling Area	Yes	217	66.16
	No	111	33.84

Source: Survey Data, 2016

4.2 Diabetes Management Services offered by Community Pharmacies

One of the specific objectives of this study is to determine the range of services Community Pharmacies provide in diabetes management. From Table 2, the sale of anti-diabetic medicines was the most common service rendered by the pharmacies (99.4%).

The monitoring service most rendered (91.2%) in the pharmacies was the measuring of blood pressure and about 73% of the pharmacies provide weight measurement service. The least (23.5%) of the monitoring services rendered was the measuring of heights.

Counseling on drug usage was done by 91.8% of sampled pharmacies and 89.7% of them provide education on diet, alcohol, tobacco and physical activities.

Keeping of patient records and identification of high risk individuals for monitoring were the least of the services rendered by these pharmacies.

Table 2: Community Pharmacy Diabetes Management Services

Type of service	Percentage (%)
Sale of Anti-diabetic drugs	99.39
Sale of Devices and accessories for Diabetes Management	78.65
Measurement of Blood Glucose	59.27
Measurement of Blood Pressure	91.19
Weight Measurement	72.56
Height Measurement	23.48
Counselling on the use of drugs	91.77
Education on Lifestyle management	89.65
Keeping of Patient Records	23.15
Screening for High Risk Individuals	9.12

Source: Survey Data, 2016.

4.3 Availability of Anti-Diabetes Drugs, Self-care Devices and Monitoring Services.

The results below reflect the availability of diabetic management services--anti-diabetic drugs, self-care devices and monitoring services-- in community pharmacies.

4.3 .1 Availability of Anti-Diabetic Drugs in Community Pharmacies

This study assessed the availability of essential anti-diabetic drugs, Self-Care Devices and Monitoring Services in Community Pharmacies. From Figure 1, Metformin (98.5%) and Glibenclamide (94.8%) were widely available. The least available insulin was the intermediate acting insulin (12.2%) whilst pre-mix insulin was the most widely available 28.1% of the Pharmacies. At least one type of insulin was available in 29.4% of pharmacies.

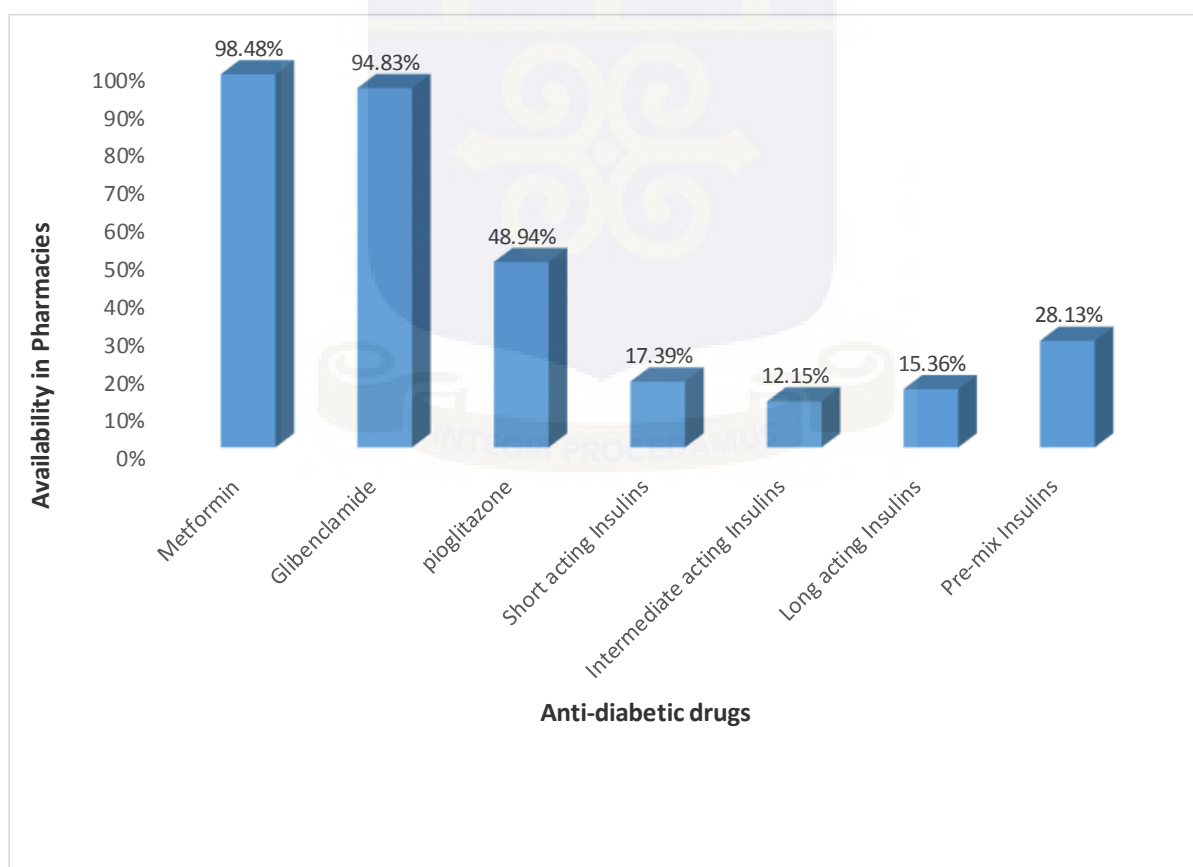


Figure 1: Availability of Anti-diabetic Drugs in Community Pharmacies

Source: Survey Data, 2016

4.3.2 Availability of Self-care Devices in Community Pharmacies

As part of the second objective of this study, the availability self-care devices and accessories were assessed by inspection. From Figure 3, availability of glucometer and glucometer strips was 47.87% and 67.07% respectively. In 94.9% of pharmacies where glucometers were available, glucometer strips were also available and in 80.77% of pharmacies where glucometers were available, lancets were available. The availability of glucometer together with glucometer strips and lancets was 37.99%. The availability of blood pressure monitors was 56.4% and urine protein test strips 2.8% of pharmacies.

Availability of insulin syringes and pens in pharmacies with insulin was 82.2%

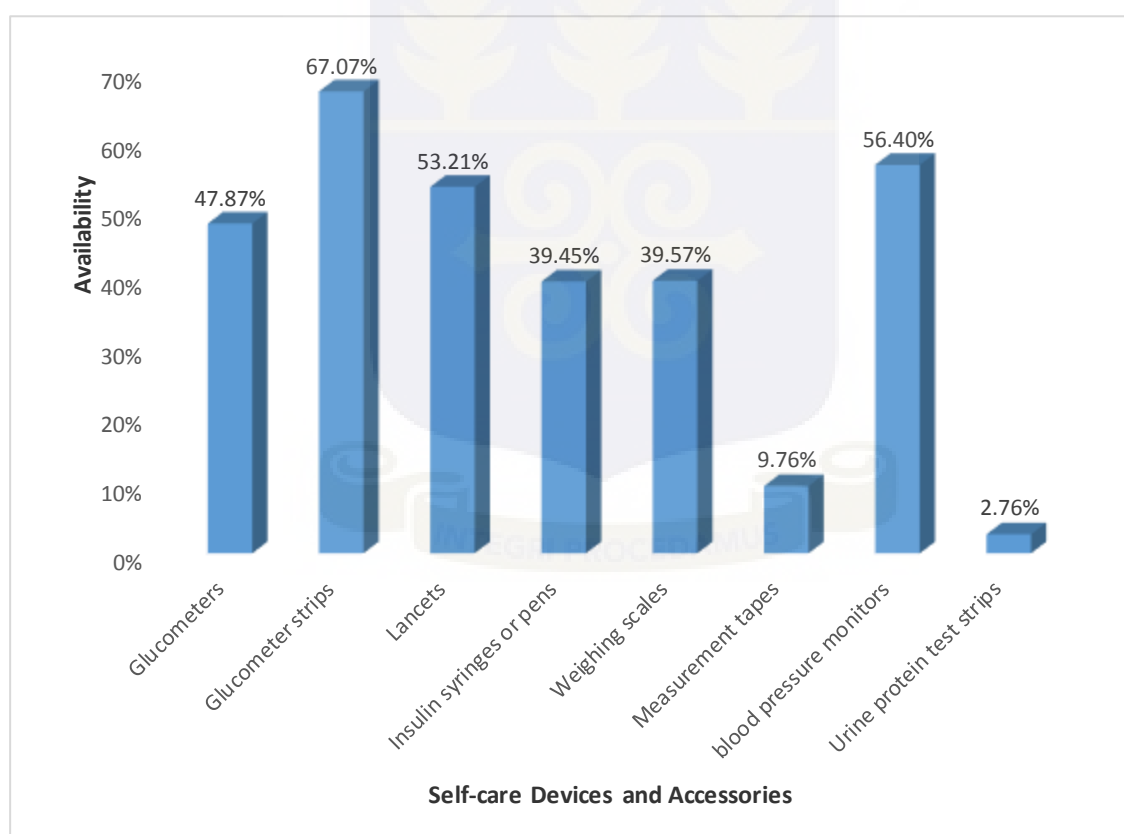


Figure 2: Availability of Self-care Devices and Accessories

Source: Survey Data, 2016

4.3.3 Availability of Monitoring Services in Community Pharmacies.

Figure 3 shows the monitoring services available in the community pharmacies at the time of inspection. These were Blood glucose, Blood pressure, weight and height measuring services. Blood pressure monitoring service was most widely available (91.2%) and height measurement was the least available (23.48%). Blood glucose monitoring services at the time of the study was available in more than half of the pharmacies.

22.19% of pharmacies had both weighing and height measurement services available.

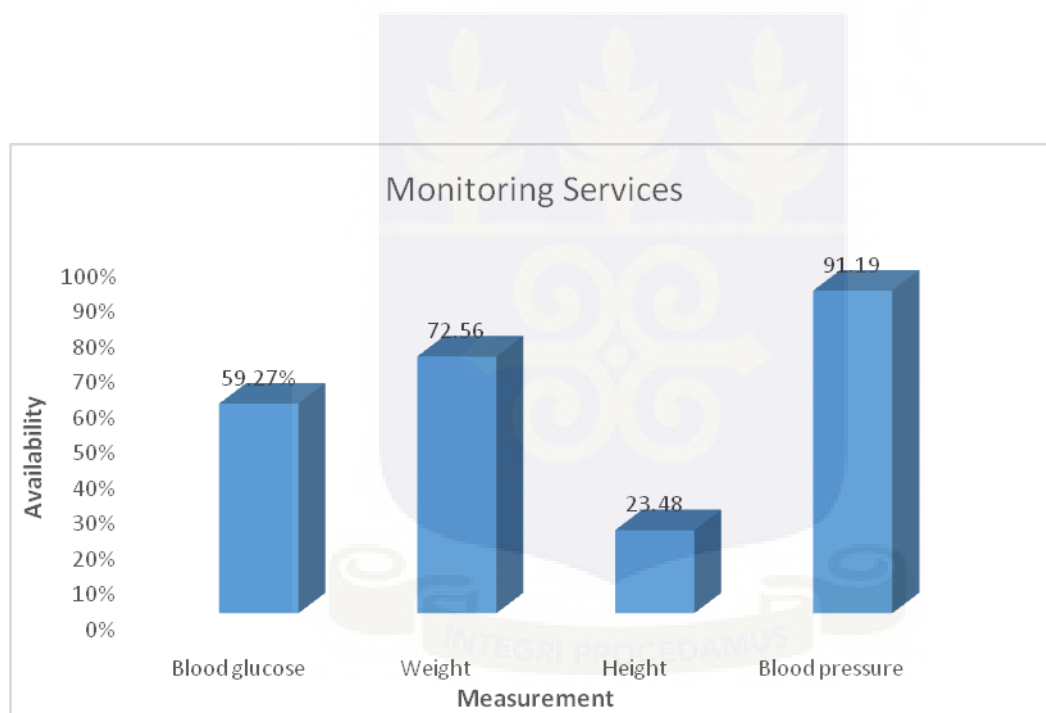


Figure 3: Availability of Monitoring Services

Source: Survey Data, 2016

4.4 Challenges to Diabetes Management in Community Pharmacies

The third objective of the study was to identify some of the challenges in providing diabetes management services in community pharmacies.

From Figure 4, Lack of demand for diabetes services other than sale of anti-diabetic drugs posed a challenge in about 41.7% (10.0% very significant and 31.75% significant) of the pharmacies. Among 40.92% of pharmacies in which the cost of monitoring equipment was identified as a challenge, 33.1% felt it was a very significant challenge. Also, inadequate knowledge of diabetes management was identified in 39.6% of pharmacies however in about 60% of them, no such challenge was identified. Among others challenges were negative attitude of patients, difficulty in pricing of services and time constraint. The least of these challenges was inadequate space with 14.9% of pharmacies indicating it was a significant problem and 4.9% regarding it as a very significant challenge. Other challenges mentioned were irregular power supply and unfair competition from the public sector.

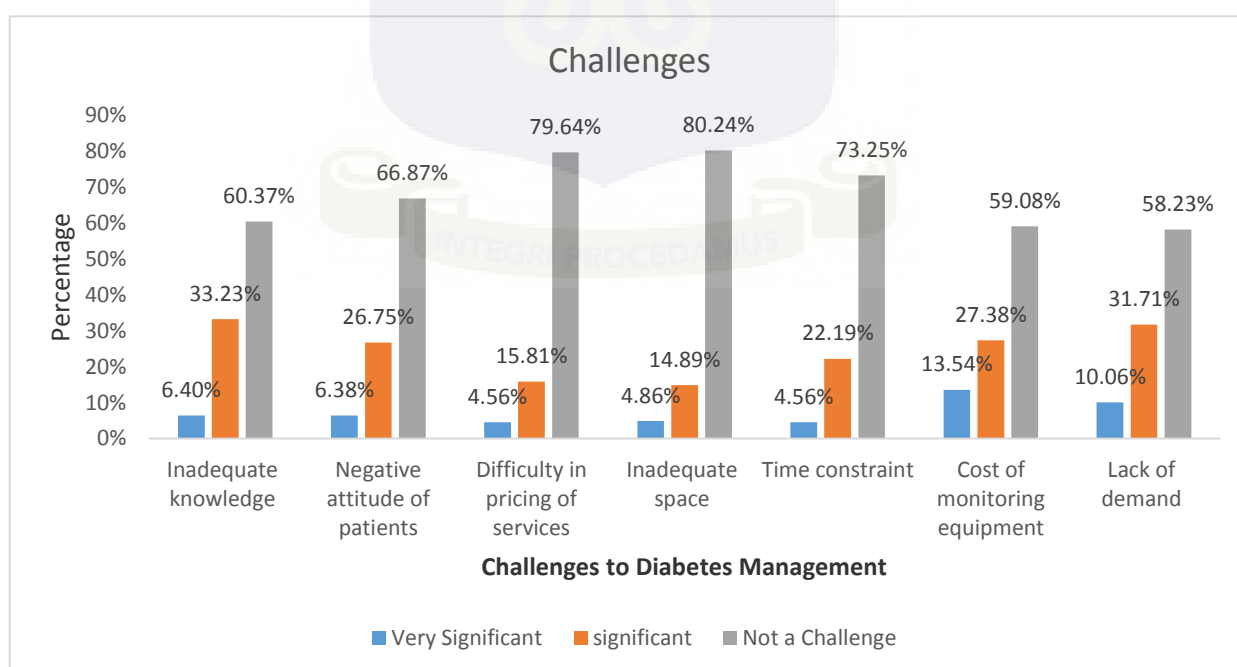


Figure 4: Challenges to Diabetes Management in Community Pharmacies

Source: Survey Data, 2016

4.5 Association between Background Characteristics of Pharmacies and Availability of Insulin.

This study assessed the association between background characteristics of the pharmacies and the availability of insulin. From the univariate logistic regression model in *Table 3*, respondent was significantly predictive of availability of insulin in a community pharmacies. The odds of a community pharmacies having insulin available was 5 times higher with pharmacies which had pharmacist respondents compared to those with non-pharmacist respondents (UOR = 4.98, 95% CI = 2.89 – 8.57). For NHIS accredited shops the odds of having insulin is 5.74 times higher compared to non-accredited shops (UOR = 5.74, 95% CI = 2.25 – 14.59). Number of branches a shop had was influential in a determining whether a shop will have insulin or not. The odds of a shop with more than one branch having insulin is 3.1 times higher compared to shops with only one branch. (UOR = 3.11, 95% CI = 1.88 – 5.16)

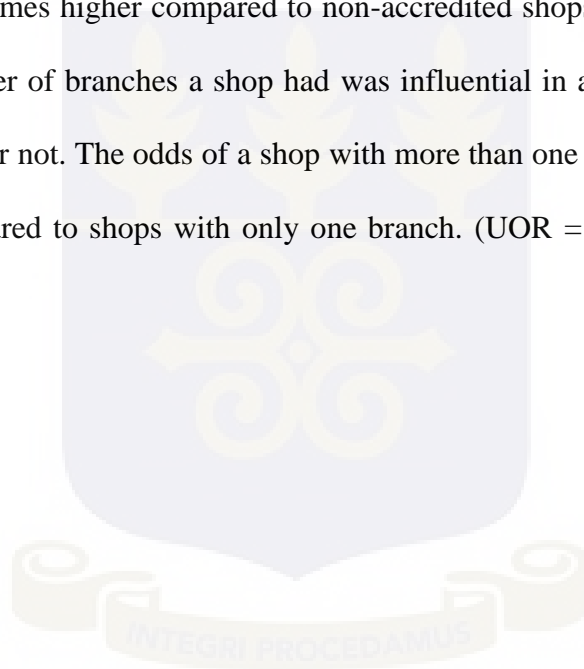


Table 3:.Association between Background Characteristics of Pharmacies and Availability of Insulin.

Background characteristics	Odds Ratio	95% CI	p-value
Type of license			
Retail only	0.45	0.18 – 1.09	0.075
Retail and wholesale			
Respondent			
Pharmacist	4.98	2.89 – 8.57	<0.001***
Non Pharmacist			
Location			
Residential	1.10	0.66 – 1.85	0.705
Commercial			
Number of yeas in operation			
≤ 5years	1.07	0.66 – 1.76	0.778
>5years			
Nature of business			
Sale of pharmaceuticals only	0.28	0.12 – 0.68	0.050
Sale of pharmaceuticals and sundry	3.56	1.46 – 8.68	0.050
Working days			
<7days a week			
7 days a week	1.05	0.59 – 1.86	0.876
Daily working hours			
<12 hours			
12 - 23 hours	0.58	0.25 – 1.36	0.211
24 hours	0.51	0.13 – 2.07	0.346
Dedicated counselling area			
Present	1.62	0.96 – 2.70	0.069
Absent			
NHIS Accreditation			
Accredited	5.74	2.25 – 14.59	<0.001***
Not accredited			
Member of special diabetic program			

Member			
Not a member	0.53	0.22 – 1.25	0.146
Number of branches			
One			
More than one	3.11	1.88 – 5.16	<0.001***

CI confidence interval, Ref: reference category, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$



4.6 Association between Background Characteristics of Pharmacies and Availability

Blood Glucose Monitoring Service.

This study also assessed the influence of background characteristics on the availability of Blood Glucose Monitoring Services. From the logistic regression model in Table 4, respondent was significantly predictive of availability of blood glucose monitoring services in a community pharmacies. The odds of a community pharmacies having blood glucose monitoring services available was 2.5 times higher with pharmacies which had pharmacist respondents compared to those with non-pharmacist respondents (OR = 2.53, 95% CI = 1.46 – 4.39). For community pharmacies that had sale of pharmaceuticals and sundry as the nature of their business, the odds of having blood glucose monitoring services available was 10.36 times higher compared to shops with Sale of pharmaceuticals only as their business nature (OR = 5.74, 95% CI = 2.25 – 14.59). Number of branches pharmacy had was influential in a determining whether a pharmacy will have blood glucose monitoring service, the odds of a pharmacy with more than one branch having this service is 3.5 times higher compared to pharmacy with one branch. (OR = 3.52, 95% CI = 2.11 – 5.85).

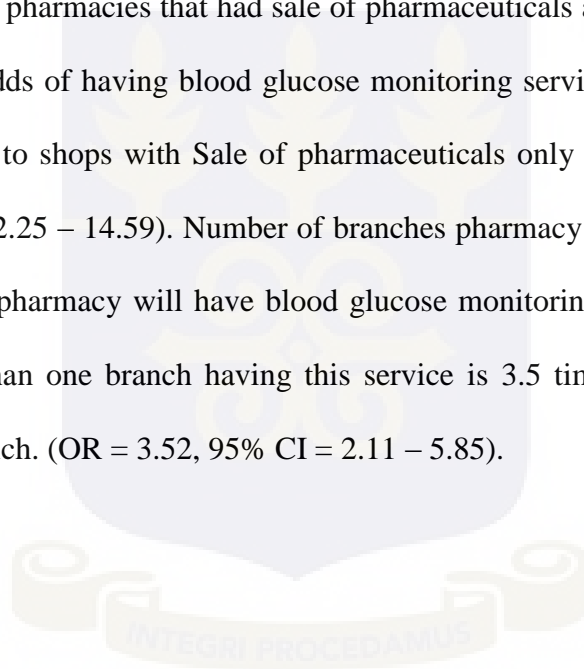


Table 4: Association between Background Characteristics of Pharmacies and Availability of Blood Glucose Monitoring Services.

Background characteristics	Odds Ratio	95% CI	P-Value
Type of license			
Retail only	ref		
Retail and wholesale	2.58	0.92-7.22	0.071
Respondent			
Pharmacist	2.53	1.46-4.39	0.001***
Non Pharmacist	ref		
Location			
Residential	1.56	0.96-2.52	0.072
Commercial	ref		
Number of Years in Operation			
≤ 5years	1.51	0.95-2.4	0.078
>5years	Ref		
Nature of Business			
Sale of pharmaceuticals only	Ref		
Sale of pharmaceuticals and sundry	10.38	4.50-23.99	<0.001***
Working days			
<7days a week	ref		
7 days a week	1.19	0.71-2.00	0.516
Daily working hours			
<12 hours	ref		
12 - 23 hours	1.40	0.61-3.22	0.429
24 hours	0.67	0.18-2.46	0.543
Dedicated counselling area			
Present	1.30	0.82-2.07	0.259
Absent	ref		
NHIS Accreditation			
Accredited	1.37	0.56-3.36	0.493
Not accredited	ref		
Member of special diabetic			

program			
Member	1.31	0.56-3.09	0.535
Not a member	ref		
Number of branches			
One	ref		
More than one	3.52	2.11-5.85	<0.001***

CI confidence interval, Ref: reference category, *p<0.05, **p<0.01, ***p<0.001



CHAPTER FIVE

DISCUSSION

5.1 Community Pharmacy Diabetes Management Services

The study revealed that community pharmacies in the Accra Metropolis provide services critical to the management of diabetes. These services include; the sale of anti-diabetic drugs (99.39) %, sale of self-care devices and accessories (78.65%) , measurement of blood glucose (59.27%), measurement of blood pressure (91.19%), education on lifestyle management (89.65%), counselling on the use of drugs (91.77%), keeping of patient records (23.15%) and screening for identification of high risk individuals for testing (9.12%).

These services cut across most of the areas of diabetes management required at primary care level in a low-resource settings, namely; early detection and diagnosis, treatment and early detection of complications (WHO, 2016).

The predominant area of management where these pharmacies provide services however is in the area of treatment, where 99.39% of pharmacies studied supply anti-diabetic drugs, 91.77% provide counselling on the use of these drugs, 89.65 % educate people on lifestyle management (89.65%) and 78.65% supply products necessary for self-care and about 60% measured blood glucose levels necessary for the monitoring of blood glucose.

Blood glucose measurement, based on which the diabetes can be diagnosed was available in almost 60% of these pharmacies even though by law community pharmacies in Ghana are not allowed to diagnose the diabetes.

In the area of early detection of complications, 92% of these pharmacies provide blood pressure measurement services which are important in the early detection of cardiovascular complications.

The services provided by these pharmacies are available to the public almost all the time since 93% of pharmacies studied open at least twelve hours a day and 80% are open all seven days of the week.

5.2 Availability of Anti-Diabetic Drugs, Self-care Devices and Monitoring Services

The results of the study indicate that anti-diabetic drugs, devices and accessories for diabetes management and monitoring services are widely available in community pharmacies within the metropolis. Whilst some of them were available beyond the 80% WHO target set for primary healthcare facilities in low-resource settings by 2025, some fell far below (WHO, 2013)

5.2.1 Availability of Anti-Diabetic Drugs

The three oral anti-diabetic drugs; metformin, glibenclamide and pioglitazone studied were available in these pharmacies.

The availability of metformin and glibenclamide were 98.48% and 94.83% respectively exceeding the 80% target set for primary healthcare facilities in low-resource settings and these figures also compare favorably with the availability of glibenclamide (100%) in publicly funded facilities in the Sekondi-Takoradi metropolis (Asibey, 2016).

In addition to the availability of metformin and glibenclamide, almost half (49.9%) of the pharmacies had pioglitazone which is listed in the standard treatment guideline (2010) for Ghana but not the WHO core list of essential drugs for primary healthcare facilities. This goes to confirm the fact that, in the supply of anti-diabetic drugs, the services of community pharmacies go beyond what is recommended at primary healthcare level.

Less than a third (29.4%) of the community pharmacies had insulin in stock at the time of the study. The availability of the various types; the short acting, intermediate acting, long acting and premix were 17.39%, 12.15%, 15.36% and 28.13% respectively.

The availability of insulin was far below the 80% target, but in line with what pertains in Africa where 60% of countries report availability of less than 50% in publicly funded pharmacies in primary healthcare institutions (WHO, 2015).

Insulins are known to be relatively expensive and reimbursement policies affect their availability (WHO, 2016). Some insulins surveyed are on the National health insurance authority's list of products for re-reimbursement but this is only done if the pharmacy supplying it is accredited. From the study, the odds of an NHIS accredited facility having insulin was almost 6 times higher than in pharmacies that were not accredited. Very few pharmacies (6.75%) however were accredited by the scheme at the time of the survey and this may have contributed to the low levels of insulin.

5.2.2 Availability of Self-care Devices and Accessories.

The self-care products identified in the pharmacies were; glucometer, glucometer strips, lancets, blood pressure monitors, insulin syringes and pens, weighing scales, measuring tapes and urine protein test strips. About 80% of pharmacies surveyed had at least one of these devices available.

Glucometers were available for sale in almost half of the pharmacies (47.87%). Besides, 37.99% of pharmacies had a combination of glucometers, glucometer strips and lancets in stock. This means 70.40% of the pharmacies that had glucometers also had the accessories available and this would make it easier for people with diabetes to get self-care blood glucose monitoring devices and accessories from one source. Availability of the accessories for the glucometer, glucometer strips (67.07%) and lancets (53.2%), outstripped the availability of

glucometers (47.87%) and this is expected since the accessories are consumables and have to be replaced very often hence there is likely to be a higher demand and a corresponding high supply of these accessories.

The availability of insulin administering devices, i.e. insulin syringes and pens was low (37.55%) in the community pharmacies however 82.2% of pharmacies that had insulin for sale also supplied devices for administering them.

Blood pressure monitors (56.40%), glucometer strips (67.07%) and lancets (53.21%) were widely available whilst glucometers (47.87%), weighing scales (39.58%), measuring tapes (9.76%) and urine test strips (2.7%) were available in less than half of these facilities

5.2.3 Availability of Monitoring Services

Monitoring services for the management of diabetes were widely available in the pharmacies sampled. Blood pressure measurement services, which allow for the early detection of cardiovascular complications were widely available (91.19%) and above the 80% target.

Services associated with early detection of diabetes identified from the study were weight and height measurement. The availability of weight measurement services (72.56%) had no correlation with the availability of height measurement (24.48%) and a combination of weight and height services (22.19%) was not widely available. This is also in line with the fact that only 9.12% of pharmacies studied indicated identification of high risk individuals for testing which would require the computation of body mass index and a combination of the two measurements and also no policy was identified to promote early detection of the disease in Ghana. There was however the DORA project from merck pharmaceuticals that was aimed at promoting early detection of diabetes among these pharmacies.

Blood glucose measurement (59.27%) services were widely available but below the 80% target. The sub optimal availability of this service could be due to the cost of monitoring equipment which was identified as one of the main challenges to diabetes management in these pharmacies.

Considering the fact that the core business of community pharmacies in Ghana is the supply of medicines and medicine information, the availability of these monitoring services appear to be relatively high.

5.3 Challenges to Diabetes Management in Community Pharmacies

Some challenges associated with the management of diabetes in community pharmacies were identified in the study. The main ones were the high cost of monitoring equipment, inadequate knowledge about diabetes management and a low demand for services other than the supply of anti-diabetic drugs.

The high cost of monitoring equipment as perceived in the pharmacies may have contributed to the sub-optimal availability of blood glucose monitoring services.

For all the challenges identified however, the proportion of pharmacies that identified them as challenges were less than the proportion that felt these were not challenges. It can therefore be suggested that community pharmacies are generally comfortable with the provision of diabetes management services.

5.4 Limitation of study

The list of medicines surveyed for availability is not exhaustive of medicines used in the management of diabetes in Ghana.

Quality assessment of the available products was not done as part of this research.

One urban district was sampled hence results from this study cannot be generalized for the whole country. However, these limitations did not affect the findings of this study significantly.



CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 CONCLUSION

Community pharmacies in the Accra metropolis provide critical services in the management of diabetes. These services cut across from early detection of the disease through its treatment to early detection of complications associated with it.

The most significant role these pharmacies play however is in the supply of anti-diabetic drugs for the treatment of diabetes where indicators of service availability compare favourably with those of primary care facilities in the public sector and some are above the WHO-recommended target of 80%.

Even though community pharmacies are not mandated to diagnose diabetes, blood glucose measurement services which provide the opportunity for diagnosis of the disease are available in almost 60% of the pharmacies studied.

Services for early detection of the disease and its complications are also available in these pharmacies with some exceeding the WHO- recommended target of 80%.

Some challenges to diabetes management in community pharmacies identified were high cost of monitoring equipment, low demand for services other than supply of anti-diabetic drugs and lack of knowledge about diabetes management.

With policy change, better orientation and support therefore, the role of community pharmacies in diabetes management can be enhanced beyond the supply of anti-diabetic drugs for treatment to cover diagnosis and early detection of complications associated with the disease.

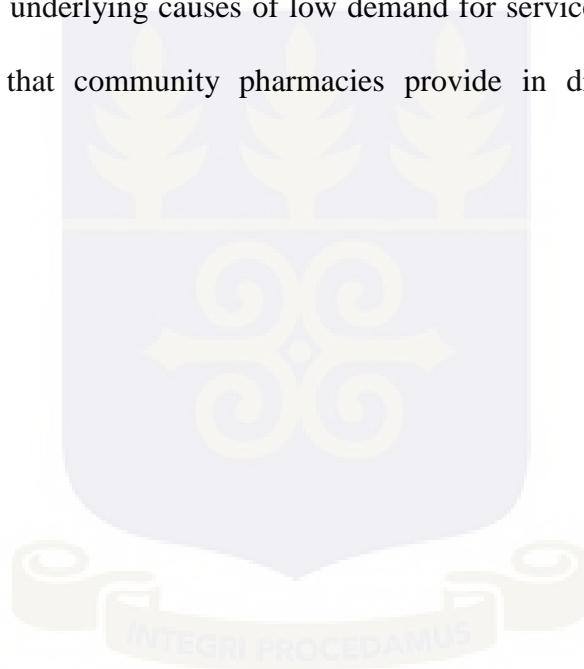
6.2 RECOMMENDATION

Policies should be introduced that broaden the mandate of community pharmacies in diabetes management, beyond the supply of anti-diabetic drugs for treatment, to cover diagnosis in order to reduce the prevalence of undiagnosed cases of the disease in Ghana.

Staff of community pharmacies should receive regular training in diabetes management.

Community pharmacies should be supported to acquire affordable monitoring devices and accessories to enhance early detection of diabetes and the complications associated with it in order to reduce premature mortality due to the disease.

A further study into the underlying causes of low demand for services other than the supply of anti-diabetic drugs that community pharmacies provide in diabetes management is recommended.



REFERENCES

- Ada. (2014). American Diabetes Association - Diagnosis and classification of diabetes mellitus. *Diabetes Care*. <https://doi.org/10.2337/dc14-S081>
- Ali, M., Schifano, F., Robinson, P., Phillips, G., Doherty, L., Melnick, P., ... Dhillon, S. (2012). Impact of community pharmacy diabetes monitoring and education programme on diabetes management: A randomized controlled study. *Diabetic Medicine*. <https://doi.org/10.1111/j.1464-5491.2012.03725.x>
- Barnes, J., Kimberly, M., Feeley, F., Nelson, G., O'Hanlon, B., & Caytie, D. (2010). *Private Health Sector Assessment in Kenya*. <https://doi.org/10.1596/978-0-8213-8359-9>
- Bettcher, D. (n.d.). Strengthening national capacities for NCDs: Where do we stand five year after the first High-level Meeting on NCDs?
- Darkwa, S. (2011). Prevalence of diabetes mellitus and resources available for its management in the Cape Coast Metropolis. *J. Health Environ. Sci*, 1(November), 1–7. <https://doi.org/10.5897/ISAAB-JHE11.012>
- Dodson, S. E., Ruisinger, J. F., Howard, P. a, Hare, S. E., & Barnes, B. J. (2012). Community pharmacy-based medication therapy management services : financial impact for patients. *Pharmacy Practice (Internet)*, 10(3), 119–124.
- Donoghue, H. E. D., States, M., & Representatives, A. P. (2015). 2030 Sustainable Development Agenda, (August). <https://doi.org/10.1017/CBO9781107415324.004>
- Franco, M., Bilal, U., Benet, M., Kennelly, J. F., & Cooper, R. S. (2013). Population-wide weight loss and regain in relation to diabetes burden and cardiovascular mortality in Cuba 1980-2010 : repeated cross sectional surveys and, 1515(April), 1–9. <https://doi.org/10.1136/bmj.f1515>
- Ghana Statistical Service. (2014). 2010 Population & Housing Census: Accra Metropolitan District Analytical Report, 78.
- Herman, W. H., Ye, W., Grif, S. J., Simmons, R. K., Davies, M. J., Khunti, K., ... Wareham, N. J. (2015). Early Detection and Treatment of Type 2 Diabetes Reduce Cardiovascular Morbidity and Mortality : A Simulation of the Results of the Anglo-Danish-Dutch Study of Intensive Treatment in People With Screen-Detected Diabetes in Primary Care, 38(August), 1449–1455. <https://doi.org/10.2337/dc14-2459>
- Idf. (2005). Diabetes. *International Working Group*, 1–5. Retrieved from https://www.idf.org/webdata/docs/background_info_AFR.pdf
- Idf Diabetes Atlas 2015 7Th Edition. (2015), 2. Retrieved from <http://www.idf.org/about-diabetes/facts-figures>
- International Diabetes Federation. (2011). Global Diabetes Plan 2011-2021. *Vasa*, 1–20. <https://doi.org/10.1017/CBO9781107415324.004>

- International Diabetes Federation Guideline Development Group. (2014). *Global guideline for type 2 diabetes. Diabetes research and clinical practice* (Vol. 104). <https://doi.org/10.1016/j.diabres.2012.10.001>
- Jingi, A. M., Noubiap, J. J. N., Onana, A. E., Nansseu, J. R. N., Wang, B., Kingue, S., & Kengne, A. P. (2014). Access to diagnostic tests and essential medicines for cardiovascular diseases and diabetes care: Cost, availability and affordability in the west region of Cameroon. *PLoS ONE*, 9(11). <https://doi.org/10.1371/journal.pone.0111812>
- Knapp, K., Ray, M., Law, A., Okamoto, M., & Chang, P. (2005). *The Role of Community Pharmacies in Diabetes Care : Eight Case Studies*.
- Management Sciences for Health. (2001). *Standard Treatment Guidelines. Drug and Therapeutics Committee Training Course*.
- Ministry of Health (GNDP) Ghana. (2010). *Ghana Essential Medicines List*. Retrieved from www.ghndp.org
- Moh, Hai, & Who. (2008). Ghana medicine price and availability monitor, (September 2007), 10.
- Quaye, E. A., Amporful, E. O., Akweongo, P., & Aikins, M. K. (2015). Analysis of the Financial Cost of Diabetes Mellitus in Four Cocoa Clinics of Ghana. *Value in Health Regional Issues*, 7, 49–53. <https://doi.org/10.1016/j.vhri.2015.08.005>
- Shrivastava, S., Shrivastava, P., Ramasamy, J., Kinra, S., Bowen, L., Lyngdoh, T., ... Anderson, R. (2013). Role of self-care in management of diabetes mellitus. *Journal of Diabetes & Metabolic Disorders*, 12(1), 14. <https://doi.org/10.1186/2251-6581-12-14>
- Tan, K. C., Chan, G. C., Eric, H., Maria, A. I., Norliza, M. J., Oun, B. H., ... Liew, S. M. (2015). Depression, anxiety and stress among patients with diabetes in primary care: A cross-sectional study. *Malaysian Family Physician*, 10(2), 9–21. Retrieved from <http://ezproxy.spu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&AuthType=ip&db=aph&AN=112368743&site=ehost-live>
- Venkatesan, R., Devi, a S. M., Parasuraman, S., & Sriram, S. (2012). Role of community pharmacists in improving knowledge and glycemic control of type 2 diabetes. *Perspectives in Clinical Research*, 3(1), 26–31. <https://doi.org/10.4103/2229-3485.92304>
- World Health Organization. (2013). Global action plan for the prevention and control of noncommunicable diseases 2013-2020. *World Health Organization*, 102. https://doi.org/978_92_4_1506236
- World Health Organization. (2016). Global Report on Diabetes. *Isbn*, 978, 88. https://doi.org/ISBN_978_92_4_156525_7

APPENDICES

APPENDIX 1: Informed Consent

Topic: AN ASSESSMENT OF THE ROLE OF COMMUNITY PHARMACIES IN DIABETES MANAGEMENT IN THE ACCRA METROPOLIS

Institution: Department of Health Policy, Planning and Management, School of Public Health, College of Health Sciences, University of Ghana

Background

My name is Ruby Anne Biaku. I am a student of the University of Ghana pursuing a Master of Public Health degree. As a part of the requirements of the course, I am undertaking a research on the topic “Assessment of the role of Community Pharmacies in Diabetes Management in the Accra Metropolis”.

Procedures

The study will involve answering questions from a questionnaire. There would be no invasive procedure like obtaining blood samples or taking in products. This research is purely academic and forms part of the requirements for the award of the MPH degree.

Your cooperation would be greatly appreciated.

Risks and benefits

The procedure will be non-invasive and will not cause pain or discomfort to the participants. The outcome of the study would be significant to policy makers in addressing some of the challenges to diabetes management resulting in an improved quality of life of diabetes patients.

Right to refuse

Participation in this study is voluntary and you can choose not to answer any or all of the questions. You are at liberty to withdraw from the study anytime. I will however encourage you to fully participate since your opinion is important in determining the issues affecting the health care needs of Ghanaians.

Anonymity and confidentiality

I wish to assure you that whatever information you provide will be handled with strict confidentiality and will be used purely for research purposes. Your responses will not be shared with anybody who is not part of the study team. Data analysis will be done at an aggregate level to ensure anonymity.

Before taking consent

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

If yes, please write.....

If you decide to ask later, please contact me, Ruby Anne Biaku, on 0208157975.

You can also contact the Ethical Review Committee Administrator, Ms. Hannah Frimpong on 0243235225.

APPENDIX 2: Questionnaire on Assessment of the Role of Community Pharmacies in Diabetes Management in the Accra Metropolis.

QUESTIONNAIRE

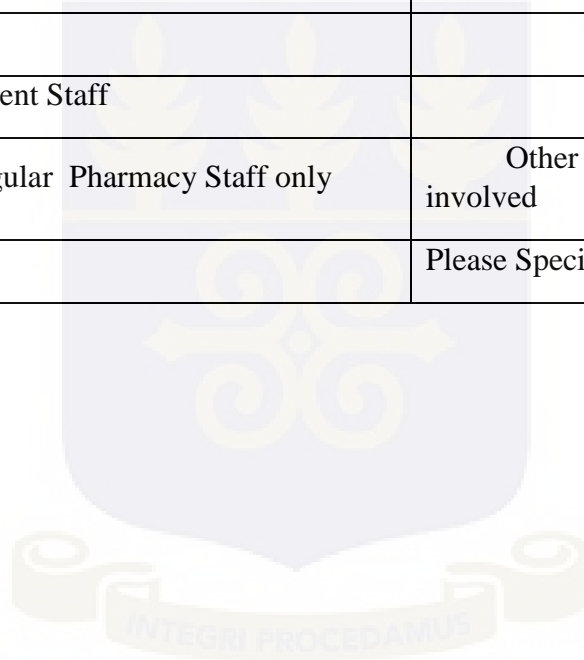
This questionnaire is for a research aimed at understanding the role that Community Pharmacies play in diabetes management. This will serve as a basis for better engaging them in the future in diabetes management to improve lives. Your support in providing the required information would be most appreciated. All information provided would be kept confidential

Please tick the appropriate box and insert comments where necessary

SECTION A: Socio-Demographic variables of Community Pharmacies

1	Type of license	
	<input type="checkbox"/> Retail only	<input type="checkbox"/> Retail and Wholesale
2	Respondent	
	<input type="checkbox"/> Pharmacist	<input type="checkbox"/> Not a Pharmacist
3	No of Retail outlets	
	<input type="checkbox"/> One (1)	<input type="checkbox"/> More than 1
4	Location	
	<input type="checkbox"/> Residential Area	<input type="checkbox"/> Commercial Area
	<input type="checkbox"/> Industrial Area	
5	Number of years in Operation	
	<input type="checkbox"/> ≤5years	<input type="checkbox"/> >5years
6	Nature of business	
	<input type="checkbox"/> Sale of Pharmaceuticals only	
	<input type="checkbox"/> Sale of Pharmaceuticals and Non `Pharmaceuticals	
7Working Days	
	<input type="checkbox"/> < 7days a week	<input type="checkbox"/> 7 Days a week

8	Daily working hours	
	<input type="checkbox"/> <12 hours	<input type="checkbox"/> ≥12 but<24Hours
	<input type="checkbox"/> 24hours	
9	Does your pharmacy have a dedicated counselling area?	
	Yes	No
10	Do you have National Health Insurance Scheme Accreditation?	
	Yes	No
11	Are you part of any special diabetes management program (s)?	
	Yes	No
	Please Specify	
12	Diabetes Management Staff	
	Regular Pharmacy Staff only	Other Professionals involved
		Please Specify



Section B: Provision of services for diabetes patients			
1	Do you sell the following in your pharmacy?		
a)	Anti-diabetic medicines	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b)	Blood glucose monitors	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c)	Blood pressure monitors	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d)	Weighing scales	<input type="checkbox"/> Yes	<input type="checkbox"/> No
2	Do you provide the following services in your pharmacy?		
a)	Counseling on the use of anti-diabetic medication	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b)	Education of diabetes patients on diet, alcohol and physical activities	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c)	Identification of high risk individuals for blood glucose monitoring	<input type="checkbox"/> Yes	<input type="checkbox"/> No
3	Do you measure the following in your pharmacy?		
a)	Blood glucose	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b)	Weight	<input type="checkbox"/> Yes	<input type="checkbox"/> No
c)	Height	<input type="checkbox"/> Yes	<input type="checkbox"/> No
d)	Blood pressure	<input type="checkbox"/> Yes	<input type="checkbox"/> No
4	Other services		
a)	Keeping No records for diabetes patient	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Others (Please Specify)	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Section C: Availability of anti-diabetic medication and devices			
Oral Anti- Diabetic Medication			
Group	Type	Available	Not Available
Biguande	Metformin	<input type="checkbox"/>	<input type="checkbox"/>
Sulphonylureas	Glibenclamide	<input type="checkbox"/>	<input type="checkbox"/>
thiazolidinediones	Pioglitazone	<input type="checkbox"/>	<input type="checkbox"/>
Insulins			
Group	Type	Available	Not available
Short Acting		<input type="checkbox"/>	<input type="checkbox"/>
IntermediateActing		<input type="checkbox"/>	<input type="checkbox"/>
Long Acting		<input type="checkbox"/>	<input type="checkbox"/>
Pre-mix		<input type="checkbox"/>	<input type="checkbox"/>
Other Items for Diabetes Management			
Item	Available	Not available	
Glucometers	<input type="checkbox"/>	<input type="checkbox"/>	
Glucometer strips	<input type="checkbox"/>	<input type="checkbox"/>	
Lancets	<input type="checkbox"/>	<input type="checkbox"/>	
Insulin syringes or pens	<input type="checkbox"/>	<input type="checkbox"/>	
Weighing scales	<input type="checkbox"/>	<input type="checkbox"/>	
Measurement tapes	<input type="checkbox"/>	<input type="checkbox"/>	
Blood pressure monitors	<input type="checkbox"/>	<input type="checkbox"/>	
Urine protein test strips	<input type="checkbox"/>	<input type="checkbox"/>	
Others (Please Specify)	<input type="checkbox"/>	<input type="checkbox"/>	

Section D: Challenges to diabetes management				
Which of the following do you perceive to be a challenge to diabetes management in community pharmacies?				
		Very significant	Significant	Not a challenge
1	Inadequate knowledge of staff on diabetes management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Negative attitude of parents towards the service provided	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Difficulty in pricing of services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Inadequate space for monitoring services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Time constraint	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Cost of monitoring equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Lack of demand for services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Others (please Specify and score				
8		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>