NON-ADHERENCE TO TREATMENT AMONG DIABETIC PATIENTS ATTENDING OUTPATIENTS CLINIC AT MUTARE PROVINCIAL HOSPITAL, MANICALAND PROVINCE, ZIMBABWE.

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ABSTRACT

Non-adherence to diabetes treatment recommendations has been associated with increases in HbA_{1C} levels, hospitalization rates, disability and overall premature deaths. This study was done to determine the factors associated with non-adherence to treatment recommendations among diabetic patients attending diabetic clinic at the Outpatients clinic at Mutare Provincial Hospital from February- April 2012.

An unmatched 1:1 Case-Control study was conducted in order to collect data from 104 Cases and 104 Controls. A total of 208 participants and aged between 19 and 98 were recruited to participate in this study. The majority of the participants were females (58 males and 150 Females). Semi-structured questionnaire was employed to collect data from the study participants where face-to face interviews were administered to sixteen key informants. The majority of the participants, 78.3% (n=163) patients were on oral anti-diabetic regimens and 11.5 (n=24) were on insulin alone and10 (n=21) were on both insulin and oral antigens.

Results from this study indicated that the prevalence of non-adherence to medication was 38.9%, diet43.3% and exercise 26%. Factors which were found to be significantly associated with non-adherence to treatment after multivariate analysis were: financial constraints (OR 7.4; 95% CI 3.20-16-93; p<0.001), travelling away from (OR 2.8;95% CI 1.70-24.71; p<0.001), when very ill (OR6.6; 95% CI 1.45-30.50; p=0.014), eating out (OR 4.4; 95% CI 1.81- 11.13; p=0.001, longer duration of diabetes treatment (more than 10 years OR 3.1 CI 1.70-5.71; p≤ 0.001), lack of detailed information on how to exercise(OR 2.3; distance from health facility (OR 2.5; 95% CI 1.15-5.50; p =0.02) and affordability of drugs (OR 3.7;95% C.I 1.81-7.59; p=0.014). However, receiving support from family (financial, material, emotional or moral OR 0.41; 95% CI 0.20-0.8; p= 0.013), being a member of the Diabetic Association (OR 0.27; 95% CI0.15-0.53; p=0.001) and having attended more than two health education sessions in the past six months (OR 0.40; 95% CI0.17-0.93; p=0.003) appeared to be protective factors against non-adherence to treatment recommendations.

Non-adherence to treatment recommendations among diabetic patients is a result of interplay of many, varied and multifaceted factors. Therefore, strategies to improve adherence among patients attending Mutare provincial hospital in Manicaland province require collaboration among important stakeholders such health care workers, the patients, care givers and the government. In addition, interventions are needed in order to enhance patient education, improve patients' self treatment behaviours and facilitate the identification and self-management skills on medication administration, dietary and exercise management. There is also need to widen the network of health care facilities through decentralizing the stocking and dispensing of diabetes drugs to peripheral sites.

Key words: *Diabetes mellitus, adherence, non-adherence, glycaemic control, facilitators, barriers.*

DECLARATION

I, Winnie Mandewo declare that this dissertation is my original work except where sources have been acknowledged. The work has never been submitted, nor will it ever be, to another university for the awarding of a degree.

Name.....

Signature.....Date.....

Supervisor's name.....Signature.....

Co-supervisor's name.....

Signature.....

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DEDICATION

I dedicate this work and the entire degree to the almighty God, my loving husband, George, our precious children, Daina, Bernadette, Eric and Victor. I also dedicate the same work to my parents, Mr. M and Mrs. L Muzorori Mashamba.

TABLE OF CONTENTS

TITLE PAGE……i

ABSTRACT ii

DECLARATION iii

COPYRIGHT iv

ACKNOWLEDGEMENTS v

CHAPTER ONE INTRODUCTION 1

1.1 Introduction.....1

1.2 Background to the study 2

1.2.1 Global prevalence of Diabetes Mellitus 2

1.2.2 Diabetes in Sub-Saharan Africa 4

1.2.3 Prevalence of diabetes in Zimbabwe.....8

1.2.4 Background of Study site.....12

1.3 Statement of the problem.....15

1.4 Study justification 15

1.5 Broad objective 16

1.6 Specific objectives 17

1.7 Research questions 17

1.8 Hypotheses.....17

1.9 Chapter summary 18

CHAPTER TWO: LITERATURE REVIEW 19

2.1 Introduction.....19

2.2 Conceptual Framework 19
2.3 Factors associated with adherence/non-adherence to treatment 21
2.4 Socio- demographic factors 22
2.5 Social support 26
2.6 Disease and treatment/therapy related factors 28
2.7 Environmental factors 33
2.8 Socio- Cultural factors.....33
2.9 Health service factors: Provider and organizational factors 36
3.0 Chapter Summary.....45
CHAPTER THREE: METHODOLOGY 46
3.1 Introduction.....46
3.2 Research design 46
3.2 Study site 47
3.3 Target population 48
3.3.1 Study Population 48
3.3.2 Study variables.....48
3.4 Sample size 49
3.5 Sampling procedure 49
3.6 Data collection tools.....50
3.6.1 Semi-structured interview guide (Appendix 1&2 Shona and English tools) 50
3.6.2 Key informant interview guide 53
3.6.3 Documentary review 53
3.6.4 Observation guide 53
3.6.5 Summary of Data collection methods 54

3.7 Data collection procedure 55

3.8 Pretesting of research instruments 55

3.9 Inclusion criteria 56

3.10 Exclusion criteria 56

3.11 Ethical considerations 56

3.12 Data management 57

3.13 Data processing 57

3.14 Data analysis 57

3.15 Chapter summary 58

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION 59

4.1 Introduction 59

4.2 Socio-demographic characteristics of the respondents 59

4.2.1 Association between socio-demographic factors and non-adherence 62

4.3 Knowledge about diabetes and related complications 62

4.4 Clinical characteristics of the respondents 64

4.6 Perceived barriers: Reasons for not adhering to treatment recommendations reported by the Cases (Non-adherers) and Controls (Adherers) 67

4.6.1 Reasons for not adhering to medication 67

4.6.2 Reasons for not adhering to diet reported by Cases and Controls 69

4.6.3 Reasons for not adhering to exercise recommendations 70

4.7 Association between socio-cultural factors, social support and non-adherence: Bivariate analysis 74

4.8 Facilitators of adherence to treatment recommendations 78

4.9 Association between Disease / therapy related factors and non-adherence 80

4.10 Association between health service factors and non-adherence: Bivariate analysis 84

4.11 Multivariate analysis: Logistic regression 91

CHAPTER FIVE: DISCUSSION, CONCLUSION & RECOMMENDATIONS 93

5.1 Introduction 93

5.2 Prevalence of non-adherence to medication, diet and exercise 93

5.3 Factors associated with non-adherence 95

5.3.2 Socio-cultural factors and non-adherence to treatment recommendations 97

5.3.3 Disease and treatment related factors associated with non-adherence 98

5.3.5 Health services factors and non-adherence to treatment 103

5.4 Implications of the findings to public health 106

5.5 Limitations to the study 106

5.6 Conclusion 107

5.7 Recommendations 109

5.7.1 Provincial level: Ministry of health 109

5.7.2 Institutional level: Mutare Provincial hospital 110

5.7.3 Individual level: Diabetes Patients 111

5.8 Further research 112

5.9 Dissemination of results 112

REFERENCES 113

LIST OF TABLES

Table 1 Socio-demographic characteristics of Cases and Controls.....60

Table 2 Knowledge about diabetes and its related complications.....63

Table 3 Reasons for not adhering to medication/drugs 67

Table 4 Reasons for not adhering to diet reported by Cases and Controls 69

Table 5 Reasons for not adhering to exercises 71

Table 6 Association between Socio-cultural factors and non adherence.....77

Table 7Association between disease/therapy related factors and non adherence 80

Table 8 Association between health service factors and non adherence 90

Table 9 Logistic regression model on possible predictors of non adherence 92

LIST OF FIGURES

Figure 1 Patients who attended DM clinic from Jan2011-March 2012.....14

Figure 2Conceptual framework.....19

Figure 3Modes of treatment.....66

Figure 4 Prevalence of non adherence to treatment recommendations.....67

Figure 5 Reasons for not adhering to prescribed medication.....69

Figure 6 Reasons for not adhering to diet.....70

Figure 7 Religious backgrounds of the respondents.....74

Figure 8 Sources of social support.....79

Figure 9 Co-morbidities reported by cases and controls.....82

Figure 10 Drugs taken to treat other conditions.....84

Figure 11 Attitude of health care workers towards diabetic patients.....89

LIST OF ABBREVIATIONS

ADA	American Diabetes Association
BMI	Body Mass Index
CDC	Centre for Disease Control
CI	Confidence Interval
CVD	Cardio-vascular diseases
DM	Diabetes Mellitus
GDM	Gestational Diabetes Mellitus
HbA1C	Glycosylated Haemoglobin
IDF	International Diabetes Federation
IFG	Impaired Fasting Glucose
MPH	Mutare Provincial Hospital
MOHCW	Ministry of Health and Child Welfare
NCD	Non-Communicable Diseases
OGTT	Oral Glucose Tolerance Test
OR	Odds Ratio
USA	United States of America
SD	Standard Deviation
SMBG	Self-Monitoring of Blood Glucose
SSA	Sub-Saharan Africa
W.H.O	World Health Organization

LIST OF APPENDICES

APPENDIX I:INFORMED CONSENT FORM.....129

APPENDIX II: ENGLISH QUESTIONNAIRE 131

APPENDIX III : GWARO REMVUMO.....140

APPENDIX IV: MIBVUNZO MUCHISHONA.....143

APPENDIX V: INTERVIEW GUIDE FOR KEY INFORMANTS 152

APPENDIX VI: CHECKLIST ON RESOURCE AVAILABILITY 153

APPENDIX VII: MUTARE PROVINCIALHOSPITAL DIET SHEET 155

APPENDIXVIII: MAP OF MANICALAND OF MANICALAND ……...158

APPENDIX IX: APPROVAL LETTERS……159

CHAPTER ONE INTRODUCTION

1.1 Introduction

Diabetes Mellitus is increasing globally. It affects millions of people worldwide and its related complications continue to be of great concern. It is a disorder which is characterized by elevated levels of blood glucose (hyperglycemia) resulting from defects in hormone insulin secretion, insulin action or both (American Diabetes Association 2003 cited by Muteiwa 2011). People with diabetes mellitus either do not produce enough insulin (type 1) or cannot use insulin property properly (type 2 diabetes mellitus (Muteiwa 2011). It is a chronic disease mainly common among adult populations.

Hypertension is considered one of the major co-morbidities of diabetes, with nearly 75% of adults with diabetes reporting high blood pressure and/or use of prescription medications for hypertension in 2003-2004(Bisiriyu 2007).

Persistent elevations of blood glucose may lead to long term complications that include macro-vascular damage (for example, ischemic heart disease, stroke, and amputation), and micro-vascular damage. Diabetes is the leading cause of other complications including blindness from diabetic retinopathy, kidney failure and resulting dialysis and non-traumatic limb amputation. Nerve damage occurs in 60-70% of the diabetes population (Muteiwa 2011). However, short-term complications include hypoglycemia, hyperglycemia, super-added infection and diabetic

Ketoacidosis and hypersomolar (coma resulting from biochemical imbalances). The rate of developing heart disease and stroke people diagnosed with diabetes is 2 to 4 times higher that of general population probably due to unstable atherosclerosis (Bisiriyu 2007, Muteiwa 2011).

Cardiovascular disease is the leading cause of death among populations diagnosed with diabetes. Mortality from heart disease is on average, three times greater in adults with diabetes, and the risk for stroke is 2 to 4 times higher in persons with diabetes (Ibid 2007). Other risk factors include physical inactivity, diet, age, family history and obesity. The major problems associated with diabetes mellitus are excess mortality and serious morbidity suffered as a result of the long-term complications. Worldwide, the disease accounts for 3.8 million deaths per year irrespective of age, sex and social status, a number similar in magnitude to the mortality caused by HIV/AIDS (WHO, 2007, HST, 2007). These are preventable deaths, especially in economically viable individuals between aged 35 to 65 years (Roglic *et al*, 2005, WHO, 2007). Regrettably, evidence shows that, in every 10 minutes, someone would die from complication(s) related to diabetes (Azevedo & Alla, 2008).

1.2 Background to the study

1.2.1 Global prevalence of Diabetes Mellitus

Although diabetes mellitus occurs worldwide, it is more common in the developed countries (especially type 2). In 2003 it was estimated that about 194 million adults globally (5.1%) in the age group 20-79 had diabetes (IDF Diabetes Atlas,

2006).Globally, the number of adults with diabetes in 2010 was estimated to be 285 million, with prevalence of 6.4%. By 2030, the estimated number will increase to 439 million with prevalence of 7.7% (Shaw et al 2010). Number of deaths in adults due to diabetes is estimated to be 3.96 million per year and mortality rate of diabetes in all ages is 6.8%, at global level (Roglic et al 2011 cited by Sanal et al 2011).

The largest proportion and absolute increase will occur in developing countries, where the prevalence will rise from 4.2% to 5.6% (IDF Diabetes Atlas, 2006 cited by Bisiriyu 2007) and Zimbabwe may not be an exception. It is projected that by 2025, the adult diabetic population in India will double to about 72 million and in China to 46 million (Ibid 2007). At the same time, diabetes prevalence is expected to increase to 2.8% of the adult population in Africa and 7.2 % in South and Central America (IDF Diabetes Atlas 2006 & Heine *et al*, 2006). The numbers of people with diabetes in the European region and Western Pacific region are 48 million and 43 million respectively, these regions coincidentally have the highest number of people with diabetes (IDF Diabetes Atlas, 2006). However, the prevalence rate of the Western Pacific region at 3.1% is significantly lower than 7.9% and 7.8% in the North American region and European region respectively (IDF Diabetes Atlas, 2006).

The prevalence of diabetes in the United Kingdom is estimated to be around 2-3% and many more cases of type 2 diabetes remain undetected (Davidson, 2005). It is a chronic disease that affects about 8% of adults in the United States (The DPPR Group, 2002). It was also projected that by 2010, nearly 26 million people would suffer from diabetes in the United States of America, 7 million remain undiagnosed and 57 million were estimated to have pre-diabetes (Narrayan et al 2003). About 5%-

10% of diabetes cases in North America are type 1 with the rest being type 2(American diabetes Association 2005).This figure is expected to reach 29 million adults in the United States by year 2050, an increase of 165% (Boyle *et al*, 2001). More than two million Canadians are estimated to have diabetes; most cases are classified as type 2 diabetes and economic burden of diabetes and its related complications is estimated at between $4 and $5 billion United States dollars per year in Canada (Dawson *et al*, 2002 quoted by Bisiriyu 2007). The estimated incidence of type 2 diabetes in Belgium is 231 new cases per 100,000 inhabitants per year (Wens *et al*, 2005). The prevalence of diagnosed diabetes in the New Zealand is 3-4%, which accounts for 115,000 people with the disease and this figure is expected to rise to over 160,000 by 2021 (MOH, 2002). Still in New Zealand, about two-thirds of the estimated increase in the number of people with diabetes is likely to be due to ageing population, longer life expectancy, and population growth in high risk ethnic groups, while the remaining one-third is likely to be due to the increasing prevalence of obesity (Bisiriyu 2007).

1.2.2 Diabetes in Sub-Saharan Africa

In Sub-Sahara Africa, diabetes is increasingly becoming a public health problem. In 2000, approximately 7.1 million people were estimated to have diabetes. It is also projected that this figure would rise to 18.6 million by 2030 (Wild *et al*, 2004). This disease is expected to affect mostly working age groups (WHO, 2007). Despite this alarming trend, awareness regarding the significance of diabetes in Africa is poor, especially amongst public and primary health-care practitioners (WHO, 2004). This chronic disease is far more prevalent among Indian descent of African, especially

South Africa and Tanzania (Rheeder 2006). In the Africa, majority of cases have type 2 diabetes (70-90%), followed by type 1 diabetes which contributes about 5-20.% of the cases (Sobngwi *et al*, 2001).

In Sub-Saharan Africa, the prevalence of diabetes appears to be higher among urban, migrant and African-origin populations living abroad when compared to rural populations (Motala *et al*, 2003). It is also more common among the wealthy and powerful individuals in Africa (Azevedo & Alla, 2008). For example, in the rural Sub-Saharan Africa, diabetes prevalence was estimated between 0.0 to 2.2%, while in the urban areas, the prevalence ranged between 2.2 to 6.7% (Sobngwi *et al*, 2001). The reasons for the difference in prevalence between rural and urban areas may include physical inactivity, unhealthy eating habits (i.e. consuming health sabotaging diets rich in saturated fats and refined sugar), increased prevalence of obesity and globalization common with urban populations (Azevedo & Alla,2008).

The natural pattern of diabetes in Sub-Saharan depends on variety of factors such as ethnicity/genetic predisposition, socio-economic status, environmental factors, sedentary lifestyle, obesity and residence (Azevedo & Alla, 2008). Preventable and modifiable risk factors associated with the development of African diabetes, especially type 2; include rapid cultural changes, increasing urbanisation and westernisation, over-reliance on imported dietary practices (such as fast and processed food), behavioural patterns and physical inactivity.

In Africa, the severity of the disease is influenced by several factors. For instance, the average number of visits for patient care by diabetic patients is very low and usually occurs only when complications are imminent (Otieno *et al*, 2003, Gning *et*

al, 2007). Studies have it that some diabetic patients seek for care from the complementary and alternative practitioners such as traditional and faith healers and only present at health care facilities when complications have occurred (Bisiriyu 2007). Another important factor impacting on diabetic management in Africa is poor access to health care. For example, differential access to health care due to various reasons such as transportation difficulties, lack of trained health care providers, limited resources and inadequate health facilities.

The potential severity of increasing prevalence rate of diabetes in African continent may be translated into severe economic burden, high morbidity and mortality rates that will surpass the impact of HIV and AIDS in the near future (Azevedo & Alla, 2008). However, the most common causes of death in the African diabetic population are infection and acute metabolic complications as compared to the developed world where renal and cardiovascular complications are known to be the prevalent causes (Azevedo & Alla, 2008).

In Sub-Sahara Africa, most people diagnosed with diabetes extremely find it difficult to achieve and maintain the desired glycaemic level of control (HbA1c < 7%). Chronic shortages of drugs (including insulin) and their high cost are the major factors for the poor glycaemic control (Otieno *et al*, 2003). This means that the economic capabilities of the health care system in most African countries may not be strong enough to withstand the burden of this chronic disease, considering the fact that the continent's resources are already overwhelmed by diseases such as HIV/AIDS, malaria and tuberculosis. Hence, a need to put in place effective and sustainable strategies to promote diabetes awareness and public health policies that

empowers individuals to diabetes self-management in order to improve the quality of life, reduce morbidity and premature mortality caused by the disease (Bisiriyu 2007). The prevalence of diabetes varies from country to country in Sub-Sahara Africa. In Botswana, the number of people with diabetes was estimated to be 25 000 in 2000 and those numbers were projected to increase up to 45 000 in 2030(IDF 2001). In Kenya, although the official statistics shows a prevalence of 3.5%, it is believed that the rate may be up to 10% of the population (Azevedo and Alla, 2008). In Tanzania, estimated number of people with diabetes was 201,000 in 2000 and this number is expected to increase to 605,000 by 2030, while in Uganda, the estimated number was 98,000 in 2000 and it is expected to rise to 328,000 by 2030 (IDF, 2001 cited by Bisiriyu 2007). In West Africa, estimated numbers of people with diabetes in Nigeria, Ghana and Cote d'Ivoire were about 1.7 million, 302,000 and 264,000 in 2000 respectively and these figures are expected to increase to 4.8 million, 857,000 and 636,000 in 2030 respectively (IDF, 2001). In North Africa, estimated number of people living with diabetes in Algeria was 426,000 in 2000 and this number is expected to rise to about 1.2 million in 2030 (IDF, 2001). In the Republic of South Africa, diabetes prevalence was estimated to range between 4.8-8.0% (Sobngwi *et al*, 2001). It was estimated that 3 million South Africans had diabetes and an estimated 3 million individuals were living with the disease undiagnosed in 2000 (IDF, 2007).

1.2.3 Prevalence of diabetes in Zimbabwe

In Zimbabwe diabetes mellitus has been reported as the fifth among the ten most common diseases (Hjelm and Mufunda 2009). From 1990-1997 the prevalence of diabetes increased from 150 to 550 per 100,000 people (Mufunda, Chatora, and Ndanbakuwa 2000). Thus, the overall prevalence increased threefold. According to the Zimbabwe National Health Profiles (1996-1998) the number of new cases recorded in the ages 15 years and above rose from 2734 cases in 1996 to 5114 cases in 1998 (MOHCW 1999). In 2003, more than 90,000 cases of diabetes were reported in Zimbabwe, an increase from the 3,000 cases reported in 1997. The Diabetic Association of Zimbabwe estimates that around 400 000 people in the country have the disease but are not aware of this chronic disease that occurs when the pancreas does not produce enough insulin, a hormone that regulates sugar in the blood (Tsiko 2006). Health experts estimate that 800 000 Zimbabweans suffer from this disease which is also reaching worrying levels in most countries in Southern Africa.

The increase of diabetes in Zimbabwe is related to changes of societies because of urbanization and industrialization, leading to changes in lifestyle from a 'traditional' and active life to a 'modern' sedentary life with unhealthy dietary habits and obesity in combination with increased longevity. Work and living situations have also become more sedentary thus increasing the risk of Non-Communicable Diseases (NCDs) (Hjelm, Mufunda Nambozi and Kemp 2003*)*. Physical inactivity increases the risk of many chronic diseases, such as type 2 diabetes (Mufunda et al 2006; MOHCW 1999). Metabolic syndrome which is a group of disorders that include

obesity, insulin resistance, glucose intolerance, abnormal lipids and hypertension has been associated with reduced physical activities (Zimnet et al 2001). Low physical activity like prolonged television viewing may contribute to metabolic syndrome through related poor eating habits (Mufunda et al 2006). Several studies have showed an association between prolonged television viewing and metabolic syndrome. Metabolic syndrome has been linked to type 2 Diabetes mellitus, cardiovascular diseases and mortality and therefore reducing sedentary behaviour has a role in the prevention of these chronic diseases (Ibid 2006).

Non-adherence to prescribed drugs schedule has been and continues to be a major problem the world over. Adherence implies to follow closely or without deviation mutually agreed collaborative approach to care including lifestyle modification recommendations in form of partnership between the patient and health care provider. Adherence to treatment is defined as the characteristics of the behaviour that defines the extent to which a patient follows a medical prescription including therapeutic lifestyle measures (Word Health Organization 2003). It is also defined by Uchenna et al (2010) as the active, voluntary and collaborative involvement of the patient in a mutually acceptable cause of behaviour to produce a therapeutic result. However, implicit in the concept of adherence is choice and mutuality. Patients internalize treatment recommendations and then either adhere to these internal guidelines or not adhere. Adherence to therapeutic lifestyle modification recommendations reduces the risk of complications associated with type 2 diabetes. Studies on this subject show that adherence is about 50% for medications in chronic diseases and much lower for lifestyle prescriptions (Lutfey and Wishner 1999;

Anderson 1995).Non-adherence to therapeutic lifestyle measures can worsen the quality of life and add to the cost of medical care including accelerating the development of new complications, and worsen existing ones (Serour *et al*, 2007).

Non-adherence to treatment occurs when patient deviates partially or completely (i.e. below acceptable level of adherence) from the mutually agreed collaborative approach to behaviour/lifestyle changes that are known to improve health status (Bisiriyu 2007). For example, non-adherence to prescribed physical activity is defined as engaging in less than 75% of prescribed physical activity goals across a four week period (Wadden *et al*, 2006 cited by Bisiriyu 2007) that is, achieving less than 150 minutes of physical activity per week or less than 30 minutes of physical activity spread over 5 or less days for four consecutive weeks. Studies have indicated that in the United States alone, non-adherence to treatment recommendations causes 125 000 deaths annually and accounts for 10% to 25% of hospital and nursing home admissions (Tang et al 2008). However, patient adherence is not only limited to medication alone but it also includes failure to keep appointments, to follow recommended dietary or other aspects of treatment.

Diabetes mellitus is considered to be one of the most psychologically and behaviorally demanding of the chronic diseases. It requires frequent self monitoring of blood glucose, dietary modifications, exercise, and administration of medication on schedule (American Diabetes Association 2000). Adherence to treatment which encompasses medication/therapy and lifestyle modification recommendations (diet and exercise) can lessen the disease burden and reduce the morbidity and mortality

associated with diabetic complications particularly type 2 diabetes mellitus. However, poor commitment to self management (including adherence to medication, diet and exercise recommendations) of diabetes is more prevalent and as result this intensifies the burden posed by this disease which include worse clinical outcomes, frequent hospitalizations, increased health care needs and increased health care cost (Lin *et al*, 2006). Studies on this subject show that adherence is about 50% for medications in chronic diseases and much lower for lifestyle prescriptions (Bisiriyu 2007, Kalyango et al 2008). It is imperative that patients adhere to their prescribed regimens to minimize the burden of the disease on the health systems. Non-adherence in chronic diseases has been described as taking less than 80% of the prescribed treatment (Lutfey and Wishner 1999). Poor glycaemic control, long term complications of diabetes and its costly hospitalizations are often worsened by patient's failure to adhere to the total diabetic care, especially therapeutic lifestyle changes (Rowley, 1999).

Studies have emphasized the importance of achieving optimal glucose control through strict adherence to medications, diet, and exercise in order to minimize serious long term complications (Bisiriyu 2007). These complications affect the patient's quality of life, increase mortality, morbidity, and economic cost to society and wastes health care resources (WHO 2003). Previous studies have also found adherence to diabetes treatment generally to be sub-optimal ranging from 23 to 77% (Kalyango, Owino and Nambuya 2008). In addition, these studies have generated varied results of the factors associated with non-adherence to diabetes treatment.

A number of health service and medicines related factors that have been cited in the literature include: poor patient provider relationship, longer time since diabetes education, side effects of the medication and pill burden. The sample sizes used in some of the studies have been very small and the method of selection of participants in some cases has led to highly selective samples that were not representative of the populations from which they were chosen. In addition, the designs used lacked random selection of study participants and proper comparison with a control group. Furthermore, most of the studies were carried out in developed countries and a few in Zimbabwe, leaving a gap in knowledge about the factors that may be associated with non-adherence to diabetic treatment in Zimbabwe and in Manicaland province in particular.

It is against this background that this study was conducted in order to determine the factors associated with non-adherence to treatment recommendations among diabetic patients attending Out Patients clinic at Mutare provincial hospital in Manicaland province.

1.2.4 Background of Study site

This study was conducted at Mutare Provincial Hospital, located in Mutare City in Manicaland province of Zimbabwe. Mutare City has an estimated population of 181 303 according to 2002 Demographic Census survey. It is a teaching and a referral hospital and its catchment area includes the whole population of Manicaland province. The most commonly spoken languages are Ndau and Chimanyika. The Outpatients department at Mutare Provincial hospital offers various services such as

general medical services as well as special services. It operates an out-patients diabetic clinic once every month. This was initiated as a result of the observation by health care providers that there was an ever increasing trend of diabetic cases. It also has in-patient facilities where medical care services are offered throughout the week. According to unpublished data at Mutare Provincial hospital, diabetes mellitus is the leading cause of deaths among the top five killer diseases, followed by malaria, hypertension, HIV/AIDS and cancer. In June 2010 Diabetic Association for Manicaland province was formed with the assistance of the Diabetes Association chairperson of Zimbabwe. Mutare Provincial hospital is now a member of the Diabetic Association in Zimbabwe. The aim of the association is to: prevent complications such as stroke, kidney failure, blindness, impotence and diabetic foot through Health education, maintain blood sugar level between 4-10 mmoles and to speak in one voice to express their concerns as diabetic patients.

Diabetic patients from various areas around Manicaland province and also from suburbs around Mutare City attend the clinic every month. The diabetic clinics usually start with health education from health care workers such as nurses, dietians and pharmacists. Again, patients are provided with diabetic diet sheets which help them to plan their meals accordingly and also to know the types of food recommended for diabetic patients (See Annex VII).

The graph below shows diabetic patients who attended the Diabetic Clinic from January 2011-March 2012.

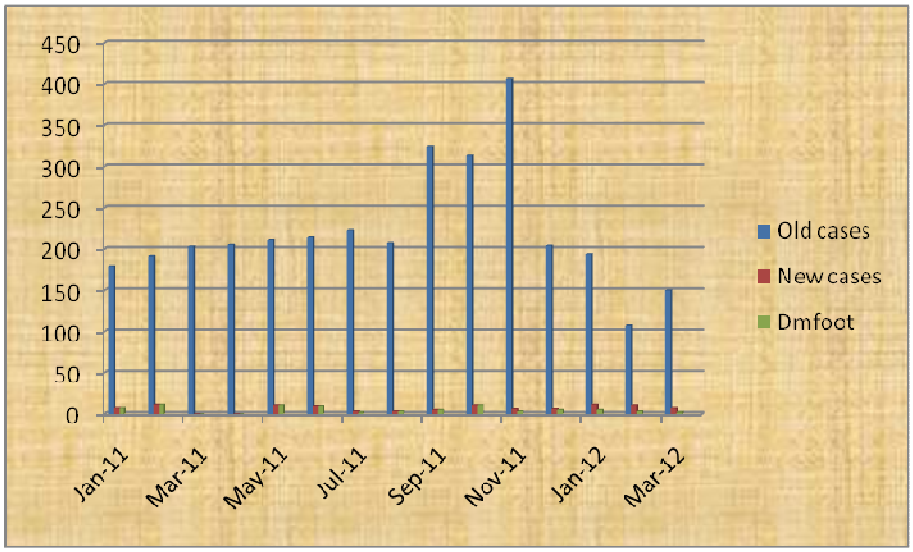


Figure 1: Patients who attended DM clinic from Jan2011-March 2012

1.3 Statement of the problem

Since the initiation of the diabetic clinic at Mutare provincial hospital in 2010, the number of patients diagnosed with diabetes continues to rise. Statistics from Outpatients diabetic clinic indicated that from January up to September 2011, 1 423 patients attended the diabetic clinic. However, according to the diabetic association chairperson for Manicaland province, despite availability of free drugs and advancement in technology, non-adherence to diabetic treatment is high among patients visiting diabetic clinic at Mutare Provincial hospital Outpatients clinic. In addition, efforts have been made to improve adherence through monthly reviews and health education but control of diabetes is suboptimal. Desk review of the diabetic register also indicated that 20% of the patients were not adhering to treatment. Hence, the need to establish the factors associated with non-adherence to treatment recommendations.

1.4 Study justification

Non-adherence to treatment is associated with high risk of morbidity, mortality and disability. It also results in many patients with diabetes being hospitalized. 20% of diabetes patients visiting Outpatients clinic at Mutare provincial hospital are not adhering to treatment recommendations (medication, diet and exercise) and frequent hospitalizations among some of the patients was reported. Forty patients were admitted in February and 23 were admitted in March 2012 due to diabetes related complications such as renal failure, diabetic stroke, heart failure, depression, and diabetic ulcer and limb amputations. Three diabetic related deaths were recorded in January 2012. If this situation continues to prevail it means more patients will die of

diabetes related complications. There was limited information regarding why patients visiting Mutare Provincial hospital were not adhering to treatment recommendations.

Therefore, this study was carried out in order to determine the factors contributing to non-adherence to treatment recommendations among diabetic patients visiting Outpatients clinic at Mutare provincial hospital. The findings would also assist policy makers in the development of policies on diabetes, diabetic management teams to develop appropriate strategies and interventions for maximizing long-term adherence to treatment recommendations thereby reducing morbidity, mortality and disability due to diabetic related complications

Identifying factors that independently influence adherence to treatment recommendations (drugs, diet and exercise) may help in improving clinical outcomes and will lead to finding more efficient ways of enhancing patient's adherence. The findings of this study may also help health care providers compare their perceived factors related to the patient's live experiences thus enhancing patient-provider communication and better therapeutic relationship that assist adherence. The information obtained in this study may be useful to other scholars doing studies in the same area.

1.5 Broad objective

To determine the factors associated with non-adherence to treatment recommendations among diabetic patients attending Out Patients clinic at Mutare provincial hospital.

1.6 Specific objectives

- To determine the socio-demographic factors associated with non-adherence to diabetic treatment.
- To establish the patients' knowledge about diabetes and its related complications.
- To determine socio- cultural factors associated with non-adherence to treatment.
- To identify disease and therapy related factors linked to non-adherent to treatment.
- To establish health service related factors associated with non-adherence to treatment.
- To make appropriate recommendations.

1.7 Research questions

- Which factors are associated with non-adherence to treatment?
- How does treatment regimen and treatment of co-infections affect adherence to treatment recommendations?

1.8 Hypotheses

Null hypothesis

Non-adherence to treatment is due to:

- Age, gender, educational level and occupation of the patient.
- Knowledge of the patients about the diabetes.
- Socio-economic factors.

- Socio-cultural factors (beliefs and attitude about the disease), disease and treatment related or health service factors.

Alternative hypothesis

Non –adherence to treatment is not due to socio-demographic factors, socio-cultural, disease or therapy related or health service factors

1.9 Chapter summary

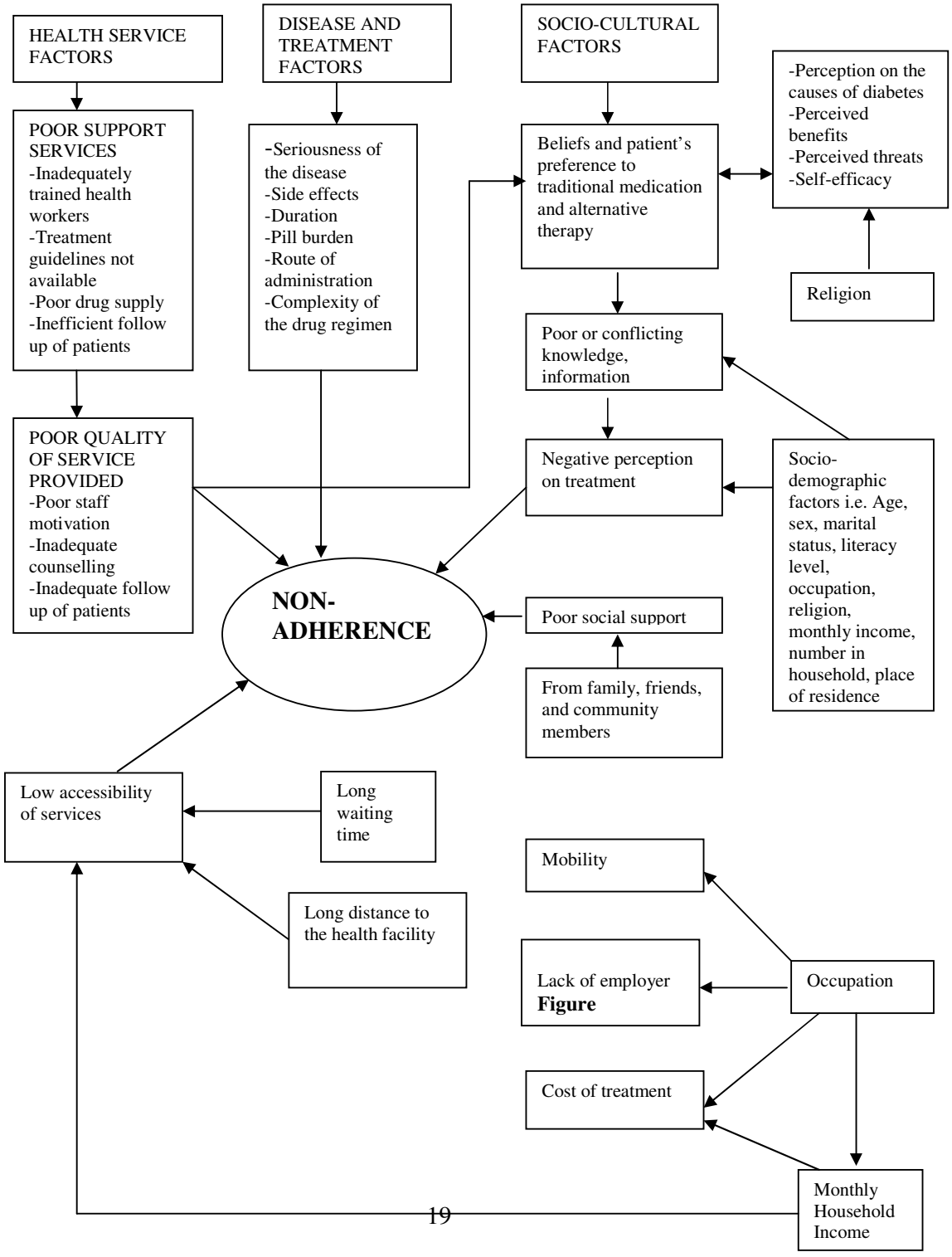
This chapter dealt with the introduction, background to the study (Global prevalence of diabetes, burden of diabetes in Sub-Saharan Africa and the burden of diabetes in Zimbabwe), statement of the problem, justification of study, broad and specific objectives, research questions and the hypotheses. The following chapter deals with the review of related literature.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter basically reviews literature related to this particular study and is centred on the factors associated with adherence/non-adherence to treatment in relation to the conceptual framework and the research objectives.

2.2 Conceptual Framework



Figure

The above conceptual framework was developed through integrating constructs from several existing models because no single model fitted the researcher's plan. It borrowed constructs of the Health Belief Model (HBM) by Stretcher and Rosenstock in Glanz et al 2001 such as perceived benefits, perceived threats/barriers and self-efficacy. The construct of perceived severity assumes that an individual patient should believe that his or her health is at risk. For instance, diabetic patients should perceive that their life is in danger if they do not adhere to treatment recommendations such as diet, drugs and exercise. The threats which are diabetic related include complications such as renal failure, blindness, heart disease, amputations and many others.

A perceived benefit also assumes that the individual believes that treatment recommendations are significant in reducing disease severity. This includes actions such as taking right amount of medication at the right time, adhering to recommended diet and exercise. Self-efficacy is defined as the conviction that one can successfully execute the behaviour required to produce the outcomes (Bandura 1977 cited by Stretcher and Rosenstock 2001). As such, diabetic patients should have the conviction that they can monitor and control their blood glucose and keep them at optimal levels. Due to the fact that adherence to treatment recommendations is a self-care process which is usually influenced by a variety of factors, the researcher also adopted behavioural health care utilization model of Phillips et al (1998). This model is one of the most frequently used frameworks for analyzing environmental and provider-related factors associated with utilization of health care services. Focus in this particular study was on the relationship among various factors such as socio-

demographic, socio-cultural environmental, health services and disease and treatment related factors. The interrelatedness of these factors is demonstrated by the conceptual framework presented above. This conceptual framework was used to formulate the objectives of the study, focus research questions, related literature and for data analysis.

2.3 Factors associated with adherence/non-adherence to treatment

Patients with diabetes mellitus have more difficulties in adhering with their treatment plans than other chronically ill patients (Hay et al 1992 cited by Golin et al 1996). Adherence with regimen is often unrelated to adherence with other parts. The most difficult parts of adherence are dietary changes and exercise (Golin et al 1996).

Various studies on patient adherence to treatment recommendations have indicated factors such as disease related factors, patient‘s socio- economic status (SES), patient demographic variables such as race, gender, health influence status and social support may have an influence on patient’s adherence to treatment.

Lower adherence to treatment may also be as a result of attitudes concerning health and illness, medication practices, beliefs, cultural and religious beliefs (Hjelm and Mufunda 2010). However, reasons for non-adherence can vary greatly. For some, adherence to medical treatment is sometimes seen as a rational choice patients make in an attempt to maintain personal identity, achieve health goals and preserve health related quality of life. Research on adherence to treatment recommendations has it that common barriers to adherence are under the patient's control, such as forgetting to take the medication, distraction by other priorities, making the decision to purposefully omit doses, not seeking information to make the best decision, and

emotional factors that do not permit taking medication (for example, depression), so that attention to them is a necessary and important step in improving adherence.

2.4 Socio- demographic factors

a) Demographic factors such as age, sex, level of education, occupation, religion, marital status, number in the household, monthly income and personal characteristics including self-esteem and self efficacy can influence patient adherence to treatment recommendations. Some studies indicated that socio-demographic factors such as age, sex, marital status and marital status were significantly associated with non-adherence (Uchenna et al 2010, Kalyango et al 2008, Rasaq et al 2009, Linda 2004). *Gender* has also been associated with adherence or non-adherence to treatment recommendations. In a study conducted by Kalyango, Owino and Nambuya (2008) at Mulago hospital in Uganda to determine the factors associated with non-adherence to diabetic treatment, it was found out that female gender was independently associated with not understanding the drug regimen well (OR= 2.95; C.I=1.39-6-24).

The findings of Kalyango et al (2008) were consistent with the findings of Montague (2002) among African Americans in which men were scored higher than women on self-care adherence. Age, marital status and occupation of the respondent were not significantly associated with non-adherence. These results were different from the results obtained by Wong et al (2010) which reported that male subjects were less likely to adhere to oral hypoglycemic agents. However, Fitzgerald *et al.* (1997) showed that self-reported adherence to exercising was higher for men than women; while women were more likely to report adherence to diet. This was probably due to

the fact that more men reported that they were told to exercise than did women (Fitzgerald *et al*, 1995).

Age of the patient may determine adherence or non adherence to treatment recommendations. In a study conducted to assess adherence to self monitoring of blood glucose conducted by Anderson et al (1995) younger adolescents reported monitoring their blood glucose concentrations more frequently than did the older ones. However, the investigators also found that older adolescents mismanage their insulin, for example, missing injections than their younger counterparts. The study also demonstrated that about a third of people with type 2 diabetes eat healthy diet and exercise regularly, however, up to one third of adults with the diabetes are completely sedentary. This was consistent with the study carried out by Cassar (2003) to establish health beliefs among the Maltese and the Anglo-Saxon in Australia which demonstrated that age predicted treatment adherence. In the study, adults with type 2 diabetes and younger age were associated with poorer dietary treatment. According to this study older adults failed to adhere due to reasons which included forgetfulness, lack of understanding of the role played by medications in managing the disease and inability to reliably administer multiple medications.

A French Population based study which was conducted by Tiv et al (2007) age <45 was found to be significantly associated with non-adherence. However, this was in contrast with the findings of the study done by Wong et al(2010) among 26,782 Chinese patients which revealed that older patients aged 50-59 were adherent to medication(AOR 1.19; 95% C.I1.06-1.34;p =0.004). These findings are similar to the study done in Hawaii among the Japanese and Filipino diabetic patients by Lee

and Taira (2005) reported that adherence was strongly associated with age, relative to the age group 55-64, adherence increased as age increased reaching a peak at 74(OR1.1; 95%C.I 1.0-1.20. Past the age 85, it was reported that adherence declined (0.90; 955 C.I 0.82-0.98). Non-adherence was also found to be prevalent among young Filipino patients.

Educational level-The educational level attained by patients may affect their adherence to treatment recommendations. In a study by Uchenna et al (2010) to establish contributing factors to treatment adherence in Enugu city in Nigeria it was revealed that there was a statistical significance between educational level attained by respondents and no-adherence. This was similar to the findings obtained at Josin Centre for diabetes, Pittsburgh, Pennsylvania by Bakker et al (1997). The study highlighted that increased educational status was associated with increased adherence to dietary recommendations and this was the same as the results of the relationship between adherence and education done in Mexico by Lo in 1999. Also in a study done by Karter et al (2000) in Kaiser Permanente in California found lower levels of education to be independently associated with non-adherence for blood glucose monitoring at least once daily in patients who had type 2 diabetes.

Knowledge about diabetes and its related complications may influence adherence to treatment. Results from study by Wens *et al.* (2005) suggest patient's deficient knowledge and diabetes contributed to non-adherence to treatment recommendations. However, various studies differ as far as the influence of knowledge on adherence is concerned. Some studies revealed that improving knowledge alone is rarely

sufficient enough to improve adherence to treatment regimen. Again, studies from developed world indicate that there is no association between patients' knowledge and adherence.

Self-esteem has been associated with adherence to self-management of diabetes among patients with type 1 diabetes. High levels of self-esteem were related to high levels of adherence to physical activity regimens, adjustment of insulin doses and dental self-care. Murphy-Bennett et al (1997) found that lower self-esteem in adolescents with type 1 diabetes was associated with less frequent testing of blood glucose.

Place of residence

Usually, patients from urban, low socio-economic areas are generally believed to be at higher risk of non-adherence. A study by Karter et al (2000) in Kaiser Permanente in California, found that patients with type 1 diabetes and living in most impoverished areas were associated with monitoring blood glucose less than 3 times a day. However, a study of 181 African Americans in East Baltimore with type 2 diabetes, a 74% adherence rate to diabetic medications was reported by Briggs et al (2005) quoted by Kenreighn et al (2005). The results contradicted the notion that patients with a lower socio-economic status have a higher rate of non-adherence.

Occupation- There appears to be a relationship between the individual's occupation and non-adherence. Studies by Tiv (2007, Chua and Chan 2011) suggested that there was an association between professionally active population and non-adherence. This study was conducted among Malaysian diabetic patients and was reported that being

currently employed was associated with non-adherence to anti-diabetic medications (OR 57.1; 95%C.I 2.4-3.9; p<0.001) probably because patients who were working were usually busy and tend to forget to take their medications or were more likely to be away from home and may not be convenient for them to take their medications.

Income-Household's monthly income can influence adherence or non-adherence to treatment recommendations. In a study conducted by Karter et al in 2000 in Kaiser Permanente in California, it was reported that those people living in impoverished areas and with an annual income of less than $13,959 were associated with poor medication adherence.

2.5 Social support

Social support has been the subject of much research. Greater social support was found to be associated with better levels of adherence to dietary recommendations and insulin administration in women with gestational diabetes (WHO 2003). Diabetes is a family disease because it affects everyone in the family who loves, lives with or cares for a person who has diabetes and how well all these people respond affects how the person with diabetes feels and how the person takes care of his or her diabetes (Uchenna et al 2010). This view is also shared with Delamater (2006) who postulates that family relationships play an important role in diabetes management. Studies have shown that low levels of conflict, high levels of cohesion and organization, and good communication patterns are associated with better regimen adherence. Greater levels of social support, particularly diabetes-related support from spouses and other family members are associated with better regimen adherence.

Social support also serves to buffer the adverse effect of stress on diabetes management (Glasgow 1988).

Uchenna et al (2010) went on to say that usually patients who feel unsupported or hassled by family and friends may be distressed. In their study in Enugu city, Nigeria they reported that some patients felt that family and friends tempt them to ignore their diabetes or did not support their efforts to manage the disease. A study done by Tiv in 2007 among the French population indicated that there was a significant relationship between non-adherence and lack of family or social support.

Parental involvement, as a measure of social support, has also been associated with adherence to blood glucose monitoring. In a study conducted by Anderson et al (1997) among adolescents and children with type 1diabetes it was indicated that those who experienced greater parental involvement with their blood glucose monitoring reported higher levels of daily checks of blood sugar concentrations. McCaul et al. (2001) followed a sample of adolescents and adults with type 1 diabetes. For both adults and adolescents disease-specific social support was associated with better adherence to insulin administration and glucose testing. For the adolescent group only, general family support was associated with adherence to insulin administration and glucose testing. However, the study found no association between any of the social support measures and adherence to diet and physical activity regimens.

2.6 Disease and treatment/therapy related factors

The likelihood of a patient's adherence to a given regimen declines with polypharmacy, the frequency of dosing, the frequency and severity of side effects and complexity of the regimen (Nyambura 2009). Research has indicated that three elements of treatment and of the disease itself have been associated with adherence: complexity of treatment, duration of disease and delivery of care. In general, the more complex the treatment regimen, the less likely the patient will be to follow it (WHO 2003). The indicators of treatment complexity include frequency of the self-care behaviour, that is, the number of times per day behaviour needs to be performed by the patient. Research has generally shown that lower regimen adherence can be expected when a health condition is chronic, when the course of symptoms are not apparent, when regimen is more complex and when treatment regimen requires life-style changes (Haynes et al 1979 cited by Delamater 2006) .Studies with diabetes patients have also indicated better adherence to medications than to prescribed lifestyle changes (Anderson et al 1993) and better adherence to simpler regimens than to more complex ones (Ary et al 1986).

Frequency of dose has been found to be associated with adherence to oral hypoglycaemic agents. Adherence to medication regimens appears to decrease with an increasing number of doses per day (Murray et al 2004). Higher adherence levels are usually reported by patients who are required to take less frequent doses (a once-daily dose) as compared to those prescribed to more frequent doses, for example, three times daily (Bennet et al (1997). In a study done by Dailey et al. (2001) among adult patients in the United States of America, it was found out that patients

prescribed a single medication had better short-term and long-term adherence rates than patients prescribed two or more medications. However, findings from the study done by Grant et al (2003) among 128 type 2 diabetic patients in the United States of America were not consistent with these findings as the total number of medicines prescribed was not correlated with medication adherence. Rather, adherence was significantly lower for medications not felt to improve current or future health.

Duration of disease appears to have a significant relationship with adherence. Studies highlight that the longer a patient has had diabetes, the less likely he or she is to be adherent to treatment. Glasgow et al. (1987) studied a sample of patients with type 1 diabetes (mean age = 28 years) and found that level of physical activity was linked with duration of disease. Patients who had had diabetes for 10 years or less reported greater energy expenditure in recreational physical activities, and exercising on more days per week than those with a longer history of diabetes. Patients with a longer history of diabetes also reported eating more inappropriate foods, consuming a greater proportion of saturated fats and following their diets plans less well. In a study by Khattab et al (2008) among the Jordanian diabetic patients it was indicated longer duration of the disease (>7years versus $\leq$ 7years (OR 1.99; P$\leq$ 0.05) was associated with being poorly controlled. This was not consistent with the results of the study carried out by Patino et al (2004) which indicated that longer duration with diabetes was significantly associated with adherence to medication and diet among adolescent diabetic patients.

Route of drug administration (Oral or injection)

Various aspects of medication regimens can also influence diabetic patients' long term adherence to treatment recommendations. For example, administration of insulin, patients may intentionally or unintentionally omit insulin shots. In a study by Chua and Chan in Malaysia in 2011, it was revealed that there was a statistically significant association between the type of medication and non-adherence. For example, the combination of oral anti-diabetic agents and insulin was found to be significantly associated with lower medication adherence ($p<0.05$).Similar results were obtained by Cramer in 2004. According to Chua and Chan (2011), this might have resulted from different routes of administration which may be inconvenient and confusing causing patients to miss their medications. These findings are similar to the findings of Khattab et al (2008) in Jordan where it was found that compared to patients who were on oral anti-diabetic agents alone, those who were on other treatment modalities were likely to be poorly controlled. For instance, it was found that insulin in combination with oral anti-diabetic agents was associated with increased odds of poor glycaemic control (OR7.50; $P \leq 0.0005$). In a study done by Polonsky et al (1994) cited by WHO (2003) it was found that female adolescents intentionally omitted insulin as a way of controlling weight.

Regimen complexity

Complicated regimens with rigid dosing intervals may also interrupt sleep (Nyambura 2009). However, Nakiyemba (2005) cited by Nyambura (2009) argues that the physical aspects of a particular medication, for example, taste, size and formulation may also affect patient's adherence.

In the US survey, Grant et al (2004) found a marked increase in the complexity of ambulatory management of diabetes. In such a scenario, the large number of medications prescribed at the time of medical visits without sufficient time to explain the reason(s) for prescribing and without patients appreciating the advantages and potential side effects of prescribed medications can easily result in patient's refusal and resistance to adhere with regular use of medications.

In addition, a study conducted by Chua and Chan (2011) in Malaysia indicated that combination therapy of insulin and oral anti-diabetic agents was found to be significantly associated with lower medication adherence (OR 3.1; 95% CI 1.7-5.7; $p< 0.001$). This was consistent with the findings of the study carried out by Cramer (2004). It was suggested that the different routes of administration might have been inconvenient, confusing and thus respondents missed their medications.

Co-morbidities/coexisting-conditions such as hypertension, asthma, depression osteoarthritis, tuberculosis and HIV/AIDS can also have an influence on the way a patient adheres to treatment recommendations.

Depression-is common among patients with diabetes and is associated with worse treatment outcomes. Several studies have shown a cross-sectional association between depression and diabetic patients' physical health status. Gonzalez et al (2008) conducted a study in order to examine the relationship between depression and treatment non-adherence in 17 000 patients with type1 and type 2 diabetes. The findings of their study highlighted that there was a significant association between depression and non-adherence in patients with diabetes (p-value <0.0001). Also other

studies indicated a significant association between depression and treatment non-adherence (Ciechanowski et al 2000, Caballero et al 2004, Schimittdiel et al 2008 Harris et al 1993). These studies highlighted that depression was associated with poorer diet, medication adherence and physical activity. Some studies have also indicated that depression was linked to poorer glucose self-monitoring.

Side effects

Regimens with significant adverse side effects have been associated with poor adherence (Broadbent et al 2010). These reactions include severe sensitivity, pancreatitis and glucose intolerance. The number and array of side effects associated with treatment regimen may be overwhelming for the patients. Adverse medication side effects, complexity of daily routines, pill burdens, lowered genetic barriers leading to drug resistance and long term uncertainties are all major factors that hinder a patient's ability to successfully adhere to a regimen. Side effects such as low blood sugar (hypoglycaemia) gastrointestinal problem and weight gain are major barriers to adherence to insulin and medications that enhance insulin secretion (Ibid 2010). Insulin treatment often leads to weight gain and Metformin tablets if poorly controlled can cause side effects (MOHCW &WHO 2011).

Previous studies (Grant et al 2004, Miccoli et al (2011) indicated that usually side effects which are perceived as secondary to anti-diabetic medication correlate with non-adherence to treatment recommendations. These findings are consistent with the study done by Lam et al (2007) were patients' self-perceiving adverse effects was associated with drug non-adherence (OR 2.5; 95% C.I 1.2-5.2; p=0.017). Most studies reported that most of the patients who experience adverse drug effects

discontinue their medication. Side effects are more likely to be experienced at the beginning of therapy and tend to decrease in frequency over time probably because of psychological rather than pharmacological factors (Flack 1996). However, non-insulin (oral anti-diabetic regimens/tablets) such as Metformin (Glucophage) is taken either twice or thrice daily and is associated with Gastrointestinal (GI) side effects especially diarrhoea but it is not associated with weight gain or low blood sugar (hypoglycemia) when used as a monotherapy (Murray et al 2004).

2.7 Environmental factors

Self-care behaviours occur in the context of a continually changing series of environmental situations at home, at work or in public and many others which are associated with different demands and priorities. As their circumstances change, patients are challenged to adjust and maintain their self-care behaviours (WHO 2003). Climatic conditions like dry hot summers and brief, cool winters may also discourage patients from adhering to the recommended physical activity. Serour *et al,* 2007) stated that intensely hot summer weather was associated with poor adherence to exercise recommendations.

2.8 Socio- Cultural factors

Beliefs about illness and medication

Patient's beliefs about seriousness of their condition and in treatment effectiveness has been associated with better dietary self-management in both type 1 and type 2 diabetes (Hampson et al 1990, Glasgow et al 1997, Skinner et al 2002 cited by

Harvey and Lawson 2008). In these studies, increased perception of control and understanding of diabetes were associated with adherence to diet self-management. These findings were consistent with the results conducted by Searle et al(2007) cited by Harvey and Lawson(2008) which revealed that perceived consequences dietary behaviours among patients with type 2 diabetes.

Patient's perceptions about treatment may contribute the greatest part of self care tasks in the management of diabetes especially type 2 diabetes. Beliefs about the consequences and controllability of diabetes and the perceived effectiveness of intervention can predict patient adherence to lifestyle measure recommendations (Farmer *et al*, 2005). The study by Serour *et al.* (2007) indicated that most patients (69.1%) had strong beliefs that adherence to a diet regimen and regular exercise could have a positive effect on their diabetic condition. Self-perceptions, beliefs and responses to diabetic condition significantly influence adherence to lifestyle measures. For example, adherence may be compromised if people with diabetes do not believe that lifestyle modification (healthy diets and physical activity) affects their glycaemia control. Study by Thomas *et al.* (2004) found that more than two third of individuals with diabetes believe strenuous exercise would improve their diabetic control but majority find it difficult to initiate and sustain.

In a study by Glasgow et al in 1997 it was found that treatment effectiveness and seriousness predicted exercise of self-management in the large mixed cohort group. However, in other studies, treatment effectiveness was not associated with perceived threat. Cassar's (2003) study among the Maltese and Anglo-Saxon tribes revealed

that people with stronger food beliefs adhered to treatment and developed fewer diabetes complications. This study also reported that participants who had weaker food beliefs adhered less with dietary treatment and developed more complications. However, this study was paralleled with other studies which showed that people who believe that a particular food is healthy tend to consume more of that food.

Perceived benefits

Patients are more likely to adhere to treatment recommendations if they believe that there are some benefits in doing so. Farmer et al (2006) carried out a study in Oxford, in the United Kingdom in order to identify beliefs about taking hypoglycaemic medication among patients who had type 2 diabetes and they found that the majority of the patients strongly agreed with the statements about the benefits of taking medication. The beliefs about benefits were strongly associated with the intention to take medication regularly hence reduced medication adherence was noted among those patients who believed that taking medication would cause unpleasant side effects and would lead to weight gain.

Self-efficacy is conviction that one can successfully execute the behaviour required to produce the outcomes (Bandura 1977 cited by Stretcher and Rosenstock (2001).

It has been studied in relation to adherence to prescribed treatments for diabetes. According to Ciherman et al (2011), people who are more adherent have a higher level of confidence in their ability to follow medical recommendations and expect more meaningful positive consequences for adherence. In a combined sample of patients with type 1 and type 2 diabetes in Canada in a study by Plotnikoff et al (2000), a measure of diabetes-specific self-efficacy beliefs was found to be the strongest predictor of energy expenditure suggesting a positive relationship between

self-efficacy and adherence to prescribed physical activity. Ott et al (2001) found that self-efficacy was a predictor of adherence to diabetes care behaviours in adolescents with type 1 diabetes. Aljasem et al (2001) showed that self-efficacy beliefs predicted adherence to a prescribed regimen in 309 adults with type 2 diabetes. The study also revealed that greater self-efficacy predicted frequent blood glucose testing; less frequent skipping of medication, binge eating and closer adherence to an ideal diet. This was consistent with the study conducted by Siqurdardo'ttir in 2005 which also highlighted self-efficacy as a strong predictor of self care among diabetic patients.

Perceived barriers

Perceived barriers to self care behaviours may be associated with poorer adherence to medication, diet or exercise. A study carried out in Kuwait by Aljasem et al in 2001 highlighted that perceived barriers to carrying out self care behaviours were associated with worse diet and exercise behaviour. This was consistent with the study done by Polly (1992) which indicated that perceived barriers to treatment were related to non-adherence. Wadden *et al*. (2006) demonstrates lack of self monitoring; injuries from physical activity; on -going medical problems i.e. concurrent medical and surgical illness; and emotional or psychiatric problems as reasons for not adhering to therapeutic lifestyle interventions. Serour *et al.* (2007) reported that understanding the barriers to adherence to lifestyle changes can help family physicians to plan and implement more intensive interventions to assist patients facing the long-term task of achieving beneficial lifestyle changes.

2.9 Health service factors: Provider and organizational factors

The impact that health service factors has on adherence to treatment recommendations should not be underestimated. Health service factors that may affect adherence include: number of health education sessions attended, duration of time since last health education, patient-health care provider relationship, cost of drugs, accessibility of the health facility (distance), expenses of getting there (transport cost), availability of drugs, lengthy delays between appointments, opening and closing times, long waiting times, knowledge of health care provider in diabetic management and unsympathetic and inconsiderate staff (Nyambura 2009, Kalyango et al 2008).

Clinic attendance-Clinic attendance may influence the patient's adherence to treatment recommendations. A study carried out by Harvey and Lawson (2007) among type 1 patients who were long-term non-attendees of diabetic clinic indicated that non-attendees had more negative views about the controllability and consequences of their diabetes. Hence, treatment effectiveness was found to be the predictor of clinic attendance. In addition, a study conducted in Uganda by Kalyango et al (2008) indicated that among those who had taken a shorter time since last visit (n=212) were more adherent to their treatment recommendations.

Health education-Effective diabetes education contributes to improved patient adherence by providing behavioural change strategies that focus on patients' unique life styles, likes and dislikes, finances, family and work issues (Bays et al 2004). More specifically, diabetes patient education programmes that address problematic beliefs and behaviours related to treatment have been shown to improve treatment adherence and health outcomes (Rubin et al 1990, Cassar 2003).

Research confirms that the only key to effective chronic disease management is to make educational interventions more widely available and accessible, ideally as part of the model in which physicians, educators and patients work as a team. In 2004, a Study to Help improve Early evaluation and management of Diabetes (SHILED) which was a longitudinal self-reported study was conducted by Bays and colleagues among 22 001 individuals who had type 2 diabetes mellitus and were aged 18 years and older in order to assess the burden and unmet medical needs in the United States of America. Findings from this study revealed that respondents who had access to diabetes education through a dietian or health educator reported better future health, tried to make healthy food choices and followed up a prescribed eating plan than those who did not see those providers (p-value <0.0001).

In the study to establish factors associated with non-adherence to diabetic treatment in Uganda, it was also found that factors such as number of health education sessions attended in the previous six months (OR = 0.51, CI=0.27–0.95), duration of time since last health education session attended (OR = 1.73, CI=1.02–2.92) and time since last visit to a health worker (OR = 3.22, CI=1.85–5.59) were significantly associated with non-adherence to treatment. The importance of health education has also been found in other studies (Rubin and Peyrot 2008, Delamater 2007, Yung et al 1998). In these studies disease knowledge and skills were lacking due to lack of adequate patient education or patients may have inappropriate health beliefs and attitudes. In a study conducted by Uchenna and associates in 2010 at UNTH, Ituku Ozalla hospital in Enugu city, in Nigeria revealed that there was greater association between health service factors and non-adherence to treatment recommendations.

The obstacles highlighted in this particular study included poor attitude of health care workers, irregular diabetes education, limited number of nutrition education sessions and delay to start appointments.

Provider-based factors

i) Patient-provider communication

Provider characteristics also affects patients' adherence to treatment recommendations although patients are responsible for their own decisions and self-care behaviours (Uchenna et al 2010). Patient outcomes are to a greater extent affected by health care providers' behaviours. For effective health behaviour change to take place, health care providers should have a patient-centred approach, establish good rapport, convey genuine interest in patients, cultivate a collaborative relationship, convey genuine interest in patients, communicate clearly and provide advice in order for patients to learn more about new recommendations (Funnell and Anderson 2000, Mason et al 1986 cited by Uchenna et al 2010). Good communication between patient and health care provider has been found to be related to improved adherence.

Patient-physician communication is an integral part of clinical practice. When done well such communication produces a therapeutic effect for the patient (Travaline et al 2005).The way in which a physician communicates information to a patient is as the important as the information being communicated. Patients who understand their doctors are more likely to acknowledge health problems, understand their treatment options, modify their behaviour accordingly and follow their medication schedules. In fact studies have shown that effective patient-physician communication can

improve a patient's health as quantifiably as many drugs (Ciechanowski et al 2001). In a study carried out by Zgibor and Simmons (2002) among type 2 diabetes on their adherence to administration of hypoglycaemic agents it was revealed that administration and monitoring hypoglycaemic and glucose were significantly worse in patients who rated their communication with their healthcare providers as poor.

Overall patient satisfaction with medical care has been found to correlate with increased adherence (Nagy 1984).The perception of providers as being warm and caring has been related to greater adherence.

Waiting time

Another quality of care which is of significant importance in maintaining high adherence levels over a long adherence levels over a long period of time is avoidance of long waiting time (Nyambura 2009). Long waiting time and other procedural barriers have been found to decrease adherence to both keeping appointments and taking medication (Ickovics and Meisler 1997).

ii) Patient-provider relationship

Positive influence of a collaborative patient-provider relationship may be particularly important and stands as the most important determinants of optimal treatment adherence (Mclane 1995 cited Ciechanowski 2004). Among diabetic patients in particular, greater satisfaction with one's patient-provider relationship is significantly associated with improved treatment adherence(Sherbourne 1989 in Ciechanowski 2004).When health care providers deliver patient-centred care which involves compassion, empathy and responsiveness to patients' needs, values and expressed preferences, patients' participation and autonomy in decision making this may

improve treatment adherence. The current healthcare system may better attend to patients with complex health care needs who actively engage in regular clinic appointments compared with patients who make sporadic visits or who prefer less substantial relationship (Karter et al 2004).

Ciechanowski et al (2001) conducted a study to establish how patient- provider relationship influence adherence to treatment among 367 patients with type 1 and type 2 diabetes in Puget Sound, United States of America. The study indicated that patients with dismissing attachment style were significantly likely to have lower levels of exercise, foot care and health diets compared with those with secure attachment style. In addition, patients with dismissing attachment were also more likely to be non-adherent to hypoglycaemic medications compared with patients with secure attachment style and these were of female gender. There was a significant relationship between dismissing attachment style and poorer adherence to diet, exercise, foot care, oral hypoglycaemic medications. There was also a significant relationship between fearful attachment style and poor adherence to exercise through the patient-provider relationship(p-value 0.001).Patients with secure attachment style were more likely than those with fearful attachment to adhere to exercise.

They also found that patients with diabetes who have pre-occupied attachment style attended clinics more often, more often report symptoms; receive more testing and care related to their diabetes. These patients were more likely to please health care professionals because of their support-seeking attachment style (Hunter and Maunder 2001, Ciechanowski 2004). Patients with dismissing attachment style had fewer opportunities to interact with health care providers and to receive the recurring

advice. Hence, greater patient-provider collaboration was significantly associated with better adherence to diet, exercise, foot care and oral hypoglycaemic medications and with lower likelihood of HbA_{1c} value <8%.

A study by Cassar (2003) also revealed that those patients who had positive attitude towards doctors had stronger food beliefs and adhered to dietary treatment. It was also found that participants who believed food and eating promote health were more aware of the benefits of healthy eating, perhaps because they were more willing to accept or agree with healthy eating advice offered by their doctors. Similar findings were obtained from a study by Landel cited by Cassar 2003 where diabetes patients who had positive relationships with their doctors were more likely to attend medical appointments and adhere to dietary recommendations. Other studies also suggest that patients were more likely to follow a treatment plan if their beliefs about the treatment of diabetes were congruent with those of their doctor (Boyer et al 1996; Freeman and 2000 quoted by Cassar 2003).

iv)Clinical inertia (lack of therapeutic adjustments in patients not attaining therapeutic goals). Adherence to therapy is not only the problem of the patient but it involves physicians as well (Zimmer et al (2006). Physicians are usually too slow in making changes of suboptimal medical regimens in diabetic patients not a target. Sometimes, poor patient adherence is associated with clinical inertia. This may be due to therapy procrastination, reluctance to embark on complex therapeutic regimens, overconfidence with prescribed treatment, lack of effective result tracking and insufficient time during clinical visits (Ibid 2006).

v) Affordability

Cost of health services may also influence the patients' adherence to treatment recommendations. A study done by Dally et al (2009) to identify the barriers associated with diabetes management and control indicated that cost of health care services was significantly the most common barrier to taking medication, following a meal plan, exercising regularly and testing of blood glucose. These findings were consistent with the findings of Uchenna et al (2010), Montague (2002), Schundt (1994) which indicated that financial variables especially direct and indirect costs associated with a prescribed regimen and restricted access to therapy influenced patient's commitment to adherence especially in developing countries. In a study conducted by Kalyango et al (2008) in Uganda it was reported that patients' or their care takers' ability to afford some or none of the prescribed anti-diabetic drugs was associated with patients' medication adherence (OR 3.70;95% CI 1.81-7.89).

Cost of medication, especially the high cost of insulin, is a major handicap to proper diabetes care in Sub-Saharan Africa. Indeed, an international survey which was carried out by the International Diabetes Federation (2003) observed that 80 percent of the people with diabetes in Sub- Saharan Africa were unable to obtain insulin and insulin syringes because they could not afford them. The cost of insulin preparations was higher in Sub-Saharan Africa than elsewhere. Insulin and insulin syringes were accessible to only 11 percent of all people with diabetes in Africa. In addition, only 25 percent of people with diabetes monitored their blood glucose. Self-monitoring of blood glucose was rarely used, mainly because of the cost of testing supplies in 90

percent and the unavailability of testing supplies in 70 percent of the countries in Africa (IDF 2003).

vi) Accessibility

Accessibility is one of the factors which may influence adherence or non-adherence to treatment recommendations among diabetic patients. Consistent access to health care and medicines also appear to influence treatment adherence For primary prevention of diabetes complications to be effective, patients must have access to quality medical care and the means to pay for services (Zgibor and Songer (2001, Murray et al 2004).

Distance: Various studies on factors influencing utilization of health services indicate that distance to health facilities and transport costs may influence patients' adherence or non-adherence. A study conducted by Karter (2000) in Kaiser Permanente in California indicated that distance and transport costs were associated with poor medication adherence particularly among rural residents.

Sources of information

Sources of information about diabetes, related complications and management can influence patients' adherence to treatment recommendations. Goering and Matthias (2010) carried out a study to understand the relationship among information usage, medication and disease management in people with diabetes indicated that patients relied most heavily on their doctors especially during initial diagnosis, health education programs, friends, family members, leaflets and the internet. It was also reported that patients who reported high adherence to treatment regimens tended to rely on different sources of information than those who reported high nonadherence.

2. 9 Chapter Summary

This chapter has covered a broad review of literature on factors influencing non-adherence to diabetic treatment recommendations. It is clear that the factors are many and varied according to different countries. Literature has it that socio-demographic factors such as age, gender, occupation and income level are associated with non-adherence. Knowledge about diabetes (signs and symptoms, complications), social support, disease and therapy related, cultural, environmental and health service factors were highlighted as having an association with non-adherence to treatment recommendations among diabetic patients. The next chapter focuses on research methodology.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter present the way in which data were collected to address the research problem outlined in Chapter one. The chapter deals with the research design, study area/site, target population, study population, sample size, sampling technique, research instruments, data collection, pilot study, ethical considerations, data quality control, data management and analysis.

3.2 Research design

An unmatched 1:1 Case-Control study was conducted in order to determine factors associated with non-adherence to treatment recommendations among diabetic patients attending the Outpatients clinic at Mutare Provincial hospital in Manicaland province of Zimbabwe between February and April 2012.

Definition of a Case

Any patient who had been diagnosed with type 1 or type 2 diabetes for the past one year and was not adhering to diabetic treatment recommendations who attended the diabetic clinic at Mutare Provincial hospital Outpatients clinic during the study period.

Definition of Control

Any patient who had been diagnosed with type1 or type 2 diabetes for the past one year and was adhering to diabetic treatment recommendations who attended Mutare diabetic clinic at Mutare Provincial Hospital Outpatients clinic during the study period.

Adherence

Adherence was defined as strictly following the dietary schedule, not skipping meals, taking all medications properly, not missing monthly resupplies of drugs as indicated by pharmacy refill data and exercising for 30-45 minutes three times per week.

Non-adherence

Non-adherence was defined as not following the dietary schedule in the previous month or missing some recommended meals in the past month (4weeks), missing monthly supply of drugs and not exercising for 30-45minutes three times per week.

3.2 Study site

This study was carried out at a provincial hospital in Mutare city in Manicaland province of Zimbabwe from February up to April 2012. Mutare city is located in the eastern border of Zimbabwe. This site was selected because it is a referral centre for the majority of patients from the whole of Manicaland province. More specifically, all diabetic patients come for reviews, hospitalization and resupply of medication. Mutare provincial hospital is also a teaching hospital in Manicaland province. It operates an out-patients diabetic clinic once per week and has in-patient facilities where medical care is provided throughout the week.

Adult patients aged 65 years and above receive free medical care including medicines when available at the hospital. Patients attend diabetic clinics which are held on the first Monday of every month for resupply of medication. During the diabetic clinics, patients are also tested for their blood pressure and blood sugar

levels. The Diabetic Association for Manicaland province was formed in June 2010 due to a noticeable increase in the number of people diagnosed with diabetes. The diabetic clinic was initiated by the association as a way of helping diabetic patients improve self management of the disease. In addition, the association helps patients to get moral and emotional support from other patients thereby reducing stigma associated with the disease.

3.3 Target population

The target population for this study was all diabetes patients with either type 1 or type 2 that attended the Outpatients diabetic clinic at Mutare Provincial Hospital within the study period.

3.3.1 Study Population

The study population for this particular study was diabetic patients attending Out Patients clinic at Mutare Provincial Hospital and the diabetic clinics held during the study period, from February up to April 2012.

3.3.2 Study variables

Dependent variable was non-adherence to treatment instructions or recommendations (drugs diet or exercise).

Independent variables were: Socio-demographic factors: sex, age, marital status, household size, highest level of education, , socio-cultural factors such as beliefs, attitude, perceptions, religion, disease and treatment related factors such as duration of disease, co-morbidities, complexity of therapy, number of doses taken per day and also health care facility and healthcare provider factors such as availability of

resources, affordability, transport cost, distance from health care facility, staff attitude, waiting time and health education sessions offered.

3.4 Sample size

Sample size was calculated using the Cochrane formula at 95% Confidence Interval (CI), the Odds ratio of 2.1 of which a variable/factor may have a significance on adherence, 80% power and expected prevalence of non-adherence of 28.9%, basing on the studies done by Bisiriyu 2007 and Kalyango et al 2008. Using the Cochrane's formula, the sample was calculated to be 104 so a total of 208 participants were recruited for this particular study (104 Cases and 104 Controls). The sample included both type 1 and type 2 diabetic patients.

3.5 Sampling procedure

Study participants meeting the inclusion criteria were selected from the out-patients diabetic clinic using systematic random sampling. Two line lists of all diabetic patients who were attending Mutare Provincial hospital diabetic clinic was obtained from the Diabetes register. One was for Cases (adherers) and the other one for Controls (non-adherers). A sampling interval was obtained by dividing the total population by the sample size (N/n), 515/208=2. The first participant was randomly selected and the randomly selected number from numbers between 1-10 using random number tables. Thereafter, the second patient aged 18 years and above was chosen to participate in this study on every clinic day. This was done until the required 104 Cases and 104 Controls were obtained.

3.6 Data collection tools

Data for quantitative part of this study was collected through the use of an interviewer administered semi-structured questionnaire with both open and closed questions and review of hospital based and patients' medical records. Qualitative data was collected through non-participant observation and through in-depth face-to-face interviews.

3.6.1 Semi-structured interview guide (Appendix 1&2 Shona and English tools)

A semi-structured questionnaire guide was designed based on an extensive literature review of similar studies (Bisiriyu 2007, Kalyango et al 2008, Patino et al 2004). The questionnaire guide was translated from English into Shona and back into English. The Shona instrument was used to collect data from the respondents for ease understanding by the respondents. The researcher also used a conceptual framework consisting of independent predictors of adherence/non-adherence including socio-demographic, socio-cultural, environmental, disease/ therapy related health service factors as well as knowledge and perceptions about diabetes to design the instruments and to guide data analysis. The semi- structured questionnaire guide was reviewed by both the academic and field supervisors and this was used to collect data from non-adherers (Cases) and adherers (Controls).

Socio-demographic characteristics

Information provided by the respondents included socio-demographic characteristics such as sex/gender, age, marital status, highest level of education, occupation, and average monthly income, other sources of income, place of residence and religious affiliation.

Personal characteristics

Also included in the semi- structured questionnaire guide were questions on personal factors such as knowledge about diabetes (causes, disease picture/signs and symptoms and complications associated with diabetes) perceived severity of diabetes and its complications, perceived benefits, self-efficacy, health services factors such as medical history, attitude towards healthcare professionals, availability and accessibility of services, proximity of the health facility to the patient's home, treatment modality (whether patient was on oral diabetic medication, insulin or both oral and insulin), drugs currently taken during the study period and this was counter-checked with their medical records.

Disease and treatment or therapy related factors

The presence of co- morbidities and clinical outcomes such as HbA_1C, fasting blood glucose levels, blood pressure measurements and co-existing conditions were also obtained from patients' medical records.

Diabetes self care adherence

The structured questionnaire guide for participants also contained questions to assess patients' adherence to diabetic self-care domains; medications, diabetic diet and exercise.

A modified version of Morisky's Medication Adherence Scale (MMAS) was used to assess participants' adherence to prescription drugs. This scale consists of 3yes/no items that ask if the individual sometimes forgets to take medications, stops taking medications when feeling better, or stops taking medications when feeling worse. A

question was also added to this scale in order determine if patients had missed the previous month's resupply date. Each domain consisted of 3 items which assessed adherence over a period of 4 weeks. In addition, reasons for non-adherence were also assessed by direct self-reporting since this was the most practical method with limited time, resources and this was also the most common method employed in literature.

A 3-item scale was created to measure the extent to which participants ate foods that are consistent with dietary guidelines for people with diabetes. The items assessed how often a patient might "eat later than you should or skip a meal," "eat foods you should avoid," and "omit foods you should eat." Responses ranged from 1=never to 5=always and reasons for failure to adhere with the recommended diet were asked.

Health service factors

Questions such as time taken to wait to be served, the language used for communication with the doctor or nurses and time last seen by the doctor (for example, <3months, >3months and I do not know) and whether the doctor has developed a plan to help the patient to manage diabetes. Patients rated items from 1(strongly disagree) to 5 (strongly agree). The questionnaire also included cost of health care services, accessibility (distance of the participant's home from the health care facility) and availability of diabetic medications/drugs. Lastly, the questionnaire included health education sessions attended on diet, drugs and exercise in the past six months.

3.6.2 Key informant interview guide

A semi-structured interview guide was used to collect qualitative data from 16 key informants. These were the Matron of the nursing department, Specialist doctor/physician, the pharmacist, the dietician, Sister-in –charge of the Outpatients department, nurse in charge for diabetic clinic, 3 doctors, 3 nurses, 2 care givers, 2 church pastors and Diabetic Association chairperson for Manicaland province) and were interviewed in order to explore their perceptions on patients' ability to control their diabetes, psychosocial and cultural factors that may be influencing non-adherence to diabetes management. The interview guide also contained questions on the prevalence of adherence and non-adherence among the diabetic patients visiting the hospital. The interview guide also assessed their perceptions on the barriers to adherence, availability of drugs, importance of health education, number of sessions done in the past six months, challenges faced in the management and control of blood glucose so as to reach optimal levels.

3.6.3 Documentary review

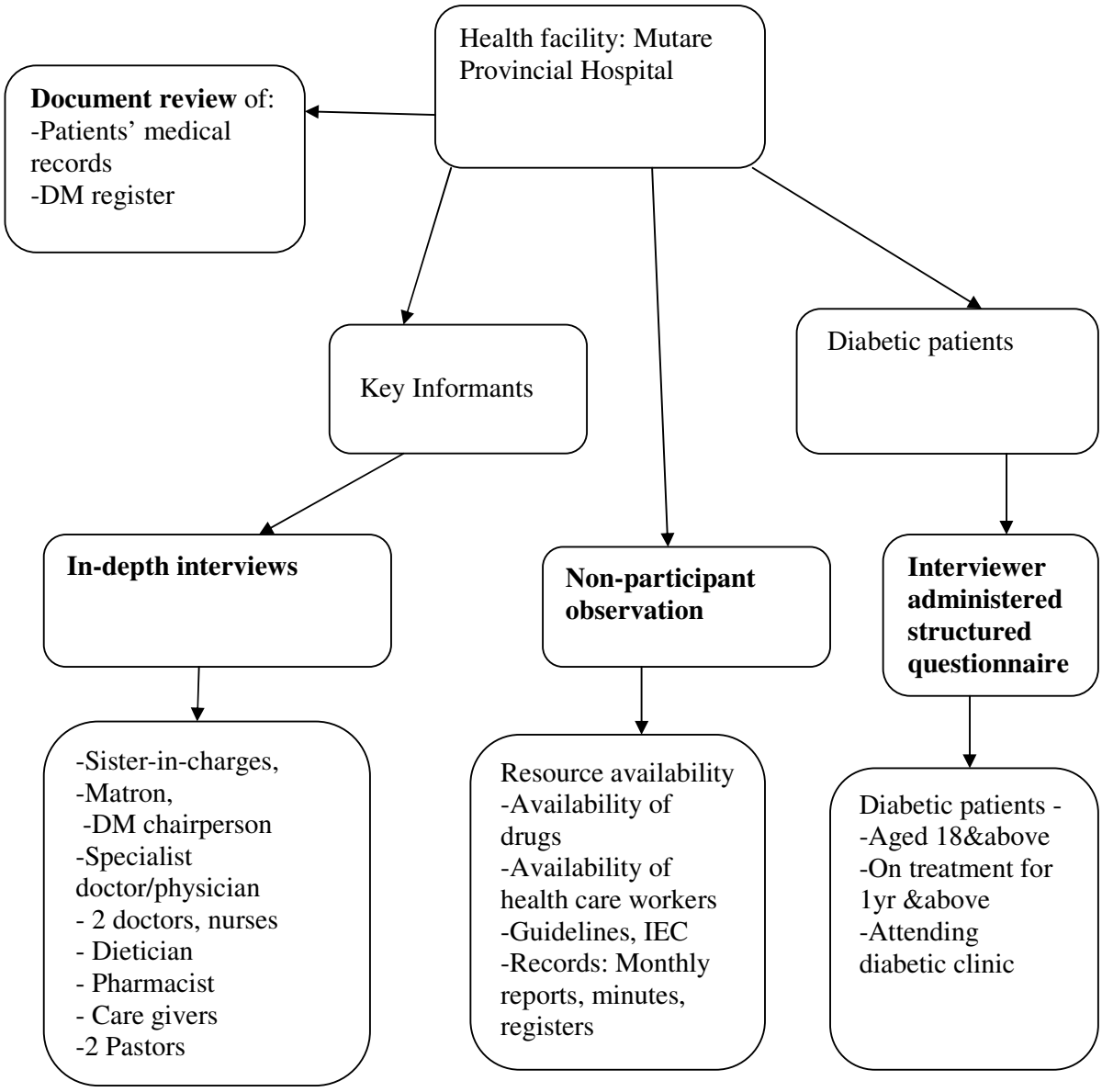
Review of patients' medical and hospital based records was done in order to counter check the information supplied by the patients particularly on treatment modality, existence of co-morbidities, number of doses taken on daily basis, age and date diagnosed with diabetes.

3.6.4 Observation guide

The researcher also used non-participant observation to observe and collect information on the nature of services provided to patients suffering from diabetes. A checklist was used to assess the human and material resource adequacy or

inadequacy (for example, availability of IEC materials, and guidelines on management of diabetes).

3.6.5 Summary of Data collection methods



3.7 Data collection procedure

Data from key informants was collected through face-to –face in-depth interviews. The interviews were carried out using open-ended questionnaire which was presented to the key informant shortly before the interview. Durations of the interviews varied from 30-60 minutes as some health care workers were willing to share their experiences whilst some needed prompts and encouragement in order to share their views and experiences. The Interviewer administered semi-structured questionnaires to the research participants and this also took 20-30 minutes. The patients were approached whilst they waited between 2-3 hours to see the doctor. Self-introduction was done by the researcher followed by explanation of the purpose and objectives of the study. When they agreed to participate in the study they signed written informed consent forms and were interviewed in an allocated private room in the clinic as they found it convenient to be interviewed at the hospital than in their homes.

3.8 Pretesting of research instruments

Research instruments were pretested in order to test for the validity and reliability of the responses. The research instruments were tested among 10 patients admitted in the Male and Female wards (5males and 5females). These respondents were not included in the study. Necessary adjustments and clarifications were made according to findings from the pretesting.

3.9 Inclusion criteria

The main inclusion criteria were: having diabetes, aged at least 18 years and above attending the diabetic clinic during the study period and willing to participate in the study through giving written informed consent to participate in the study. Patients with co- morbidities such as hypertension, asthma, HIV/AIDS and many other conditions were also included in this study.

3.10 Exclusion criteria

Patients who were very ill and those newly diagnosed with diabetes (less than one year) were excluded from this study. Following these criteria, five patients were excluded from participating in this study because they were too ill and 41 patients were also excluded because they were newly diagnosed.

3.11 Ethical considerations

Permission to carry out this study was obtained from the Medical Research Council of Zimbabwe (MRCZ/B/298), Africa University - Faculty of Health sciences, Provincial Medical Directorate, Manicaland province, the Superintend for Mutare provincial hospital, in-charge of the nursing department and the Sister in -charge of the Outpatients department. The purpose and objectives of the study were explained to the participants. The patients were requested to participate in the study and if agreed, written consent was sought before carrying out this study. Information obtained was kept private and confidential. No names or addresses were used for data analysis. Each subject was assigned a study identification number and these subject identifiers were not released outside the research group. Respondents were informed that their data was anonymous.

3.12 Data management

Data sorting

As this was a comparative study, data collected was soon sorted after collection according to the two groups-that is, Case or Control groups. The questionnaires were labelled Non-adherer for Cases and Adherer for Controls.

3.13 Data processing

Regular cross checking and scrutinizing of the information supplied was done on the research instruments to ensure accuracy, relevance and uniformity of data collected. Data cleaning and also checking for completeness and internal consistency was done before entry into computer statistical programme: Epi Info version 3.5.3. After entry of questionnaires, errors such as question duplication were checked and corrected. Each questionnaire was coded. Qualitative data collected from semi-structured interviews was coded, categorized analyzed as emerging themes and summarized into figures and tables. This was done following several methods used by many authors in qualitative research as a guide (Bowling 2002, Silverman 2004, Pope and Mays 2000 and Morse and Field 2002).

3.14 Data analysis

Statistical analysis of data was performed using Epi-info version 3.5.3. Relationships between and among variables were examined. Frequencies and means for different variables were generated in order to describe the socio-demographic characteristics of both Cases (Non-adherers) and Controls (Adherers).Tables and graphs were used to present the information. The tables command was used to stratify variables and come up with 2x2 tables, Odds ratios, p-values and confidence intervals. Stratified

analysis and multivariate modelling were done to check for confounding variables and to identify the factors associated with non-adherence to treatment. All statistically significant variables, of which the level of significance was set at p-value <0.05 in bivariate analyses were included in Logistic regression model. Chi-square test and p-values were used to determine the significance level of the results/factors. Fisher's exact was used to determine the significance of the association between the identified factors and non adherence to treatment recommendations.

Suggestions and proposals on ways to improve treatment adherence were compiled into 3 categories: those obtained from; patients, key informants and health care workers. Data from key informants was then triangulated with quantitative data obtained from the study participants in order to cater for reliability and validity of the study results.

3.15 Chapter summary

This chapter dealt with the research design and methodology employed to collect data. This involved triangulation of both quantitative and qualitative methods in order to have a more detailed and a more balanced picture of the situation. Triangulation also helps to enhance the reliability and the validity of the study results. Information was provided on the study population, study site, sample size, sampling procedure, data collection tools, inclusion and exclusion criteria, ethical considerations and data analysis. The next chapter will deal with the results of the study.

CHAPTER FOUR: DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents and analyses data collected from sixteen key informants and 104 Cases (non-adherers) and 104 Controls (adherers). It also attempts to address the objectives of the study and to provide answers to the research questions.

4.2 Socio-demographic characteristics of the respondents

Between February and April 2012, a total of 208(104 Cases and 104 Controls were recruited to participate in this study. Cases (non-adherers) were aged between 19-84 with a mean age of 60 years and median age of 62 years. The ages of the Controls ranged from 23-98 with a median age was 63 years. The majority of both Cases (54.8%) and Controls (52.2%) were in the age group 61-80, seventy-two percent (72: n=150) were females and 28% (n=58) were males, 60.6% (n=126) were married, 37%(n=77) were widowed and 2.4%(n=5) were single, of these, 76.3% were in monogamous unions and 23.7% were in polygamous unions. 40% (n=84) were Protestant (Anglican, United Methodist church, Methodist church in Zimbabwe, United Baptist Church), 43(20.7%) were Apostolic, 43(20.7%) were from Orthodox churches such as Roman Catholic. 30(14.4%) were Pentecostal, 6(2.9%) were atheists and 2(1%) were African traditionalists.

95(45.7%) of both cases and controls had secondary education, 85(40.9%) had primary education, 18 (8.7%) were not educated, 6(2.9%) had tertiary education and

4(1.9%) had Adult Literacy education. The majority 94(45.2%) lived in high density suburbs, 88(42.3%) were from rural areas, 14(6.7%) were low density suburbs, 2 were from mines, one was from a farm, Nine;5 cases and 4 controls were from peri-urban areas like Zimunya, Chigodora, Dora and Dora- pindo. 75.5 %(157) of both cases and controls were unemployed and 24.5% (51) were employed. 13.5%(28) were earning less than $100 per month,12%(25) were earning between $100-200 and 6.3% (13) were earning between $200-500. Table 4.1 below summarizes the socio-demographic characteristics of the respondents.

Table 1 Socio-demographic characteristics of Cases and Controls

Variable	Cases n= 104(%)	Controls n=104(%)
Sex		
Male	25(24)	33(31.7)
Female	79(76)	71(68.3)
Age		
19-40	8(7.7)	8(7.7)
41-60	38(36.5)	38(36.5)
61- 80	57 (54.8)	54(52.4)
Above 80	1(1)	4(3.8)
Marital status		
Married	67(64.4)	59(56.7)
Single	3(2.9)	2(1.9)
Widow/Widower	34(32.7)	43(41.3)
Number in the household		
1-3	24(23.1)	18(17.3)
4-7	69(66.3)	79(75.9)

8-10	9(8.6)	7(6.8)
Above 10	2(2)	
Highest educational level		
None	9(8.7)	9(8.7)
Primary	47(45.2)	38(36.5)
Secondary	44(42.3)	51(49)
Tertiary	2(1.9)	4(3.8)
Adult education	2(1.9)	2(1.9)
Occupation		
Student		1(1)
Employed full time	15(14.4)	16(15.4)
Employed part time	4(3.8)	2(1.9)
Business/Self-employed	4(3.8)	9(8.7)
Unemployed	81(77.9)	76(73.4)
Place of residence		
Rural	49(47.1)	39(37.5)
High density suburb	41(39.4)	53(51)
Low density suburb	6(5.8)	8(7.7)
Peri-urban	5(4.8)	4(3.8)
Farm	1(1)	-
Mine	2(1.9)	-
Religious affiliation		
Traditional African	2(1.9)	-
Apostolic	22(21.2)	21(20.2)
Orthodox	17(16.3)	26(25)
Protestant	44(42.3)	40(38.9)
Pentecostal	16(15.4)	14(13.5)
None/Atheist	3(2.9)	3(2.9)
Average monthly income		
None	73(70.2)	69 (66.3)
<100	16(15.4)	12(11.5)

100-200	7(6.7)	17(16.3)
200-500	8(7.7)	6(5.8)
Duration of diabetes treatment		
1-5 years	57(54.8)	53(50.9)
6-10 years	26(25)	24(23)
11-20 years	13(12.5)	11(10.5)
>20years	8(7.6)	16(15.3)

4.2.1 Association between socio-demographic factors and non-adherence*: Bivariate analysis*

Initial bivariate analysis indicated that there was no statistically significant association between all of the socio-demographic factors mentioned in the above table. These included sex, age, marital status, and number in the household, highest level of education, place of residence, religious affiliation, occupation, and average household monthly income.

4.3 Knowledge about diabetes and related complications

Overally, knowledge about the causes or risk factors associated with diabetes was low among Cases and Controls. 46.2% of the Controls and 32% of the Cases were able to state at least two causes of diabetes and the most frequently reported causes were family history and age. No lifestyle causes were mentioned such as obesity, physical in activity, diet rich in saturated fats, low intake of fibres and processed foods. Surprisingly, higher knowledge was demonstrated on the signs and symptoms of high and low blood sugar and also the complications associated with having

diabetes among both Cases and Controls. Table 4.2 below shows knowledge on diabetes and its related complications among cases and controls.

Table 2 Knowledge about diabetes and its related complications

Variable	Cases (n=104) N (%)	Controls(n=104) N (%)
Do you know the causes of DM?		
Yes	33 (32)	48 (46.2)
No	71 (68)	56 (53.8)
Signs & symptoms		
Feeling thirsty	85 (81.7)	88 (84.6)
Sweating	60 (57.7)	59 (56.7)
Frequent hunger	51 (49)	48 (46.2)
Frequent urination	53 (51)	59(56.7)
Kidney failure	25 (24)	30 (28.8)
Headache	70 (67.3)	68 (65.4)
Weight loss	7 (6.7)	3 (2.9)
Complications		
Death	23 (22.1)	22 (21.5)
Blindness	101 (97.1)	95 (91.3)
Diabetic foot/ulcer	55 (52)	51 (49)
Memory loss	48 (46.2)	47 (45.2)
Impotence	3 (2.9)	1 (1)
Amputations	80 (76.9)	76 (73)

Awareness of having diabetes

Most of the interviewed cases and controls, 189(90.8%) were not aware that they had diabetes until they experienced signs and symptoms of the disease such blurred vision, extreme thirst, mild stroke, high blood pressure, diabetic foot, and other signs. These signs prompted them to seek treatment from private clinics or they were hospitalized. The respondents also reported that they experienced extreme tiredness, extreme thirst common symptoms among diabetic patients and they ignored them until they developed some complications or they were admitted at the hospital as recounted by participant number NA 103.

Two of the interviewed health workers agreed that most patients delay diagnosis because they are not aware that they have diabetes until they present to the hospital with some complications. One of the key informants also reported that, '*From our own study about three quarters of the diabetic patients are not aware that they have diabetes.''* However, 33.6% (n=70) of both Cases and Controls indicated that they were aware that they had diabetes due to family history. They either had members of the immediate family who had died or was suffering from diabetes. One control female respondent reported that she knew that she had diabetes because her mother, sister and brother died of diabetes.

4.4 Clinical characteristics of the respondents

87.1% (n=88) of the Cases and 77.9% (n=81) of the Controls were suffering from other diseases which included hypertension, asthma, ulcers, Tuberculosis and HIV/AIDS. As far as the duration of treatment for diabetes for both Cases and Controls was concerned, 57 (78%) Cases and 53(41.3%) Controls had been on

diabetic treatment for 1-5 years, 26(25%) Cases and 24 (23%) Controls had been on treatment for 6-10 years. Thirteen,13 (12.5%)of the Cases and 11(10.5%) of the Controls had been on diabetic treatment for 11-20 and 8(7.6%) Cases and 16(15.3%) Controls had been on treatment for diabetes for more than 20 years.

Most of the patients (72.3%) discovered their diabetic status during medical checkups for symptoms related to diabetes and or its complications. The majority of both Cases, 84(82.4%) and 83(79.8%) Controls were taking tablets only, 12 Cases (11.5%) and 12(11.5%) Controls were taking insulin only and 8(7.6%) Cases and 9(8.6%) Controls were taking both oral tablets and insulin. In addition, the majority of the participants, 85.3% Cases and 80.7 % Controls were on Metformin and 81.7% Cases and 82.7% Controls were on Glibenclamide. For those on insulin, 24(11.5%) protaphane was the most commonly used form of insulin.

Among the Cases, 62.5% (n=65) and also 62.5%(n=65) of the Controls were taking tablets or insulin three-times –daily. 35.6% (n=37) of the Cases were taking their medication twice daily, 31.7%(n=33) of the Controls were their medication twice-daily, 1.9%(n=2) Cases and 2.9% (n=3) Controls were four-times –daily and 2.9% of those Controls were taking their medication once-daily. No one of the Cases reported taking tables or insulin once-daily.

However, 49 % of the Cases and 57% of the Controls knew the names of the medications they were using, 17% Cases and 23% Controls were also able to name their medication and 34% Cases and 20% Controls did not know at all the names of the anti-diabetic medications they were taking. In addition, their glycaemic control was suboptimal and required more aggressive management of these

patients.14.4%(n=15) of the Cases and 3.8%(n=4) of the Controls reported experiencing some side effects as a result of anti-diabetic medications which they used. The most commonly reported side effects were diarrhoea, headache, constipation, dizziness, nausea and vomiting.

Figure 3 below shows the modes of treatment used by both Cases and Controls (N=104 Cases 104 Controls)

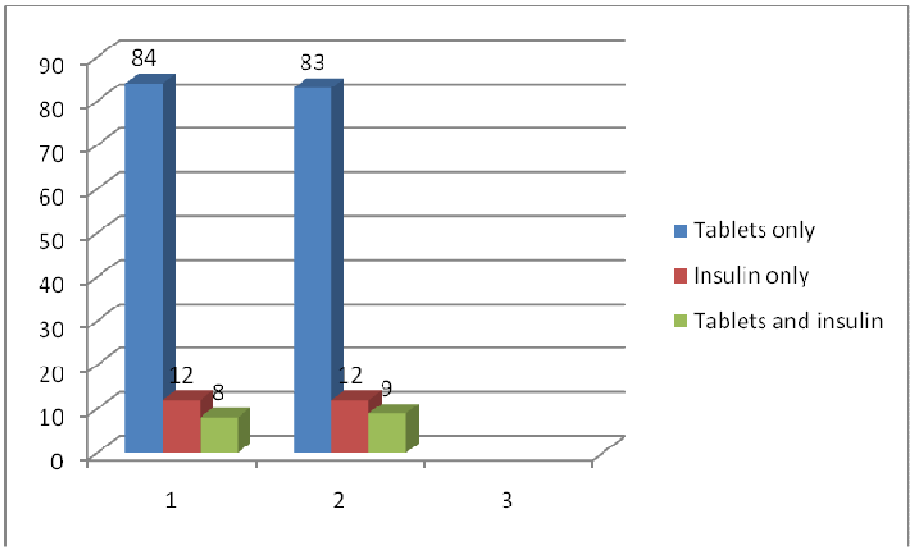


Figure 3Modes of treatment

4.5 Prevalence of adherence/non-adherence to medication, diet and exercise

Higher prevalence of non-adherence was reported among Case group for dietary recommendations (43.3%) followed by medication/drugs (38.9%) and exercise 26%. Among the Control group, it was the reverse of the Case group, whereby higher rate of non-adherence was reported on exercise, 20 (19.2%) followed by medication, where 17(16.3%) reported

that they forgot to take their medication once in the past 4 weeks and 7(6.7%) reported that they were not adherent to diet.

Figure 4 below summarizes the prevalence of non-adherence to medication, diet and exercise among both Cases and Controls.

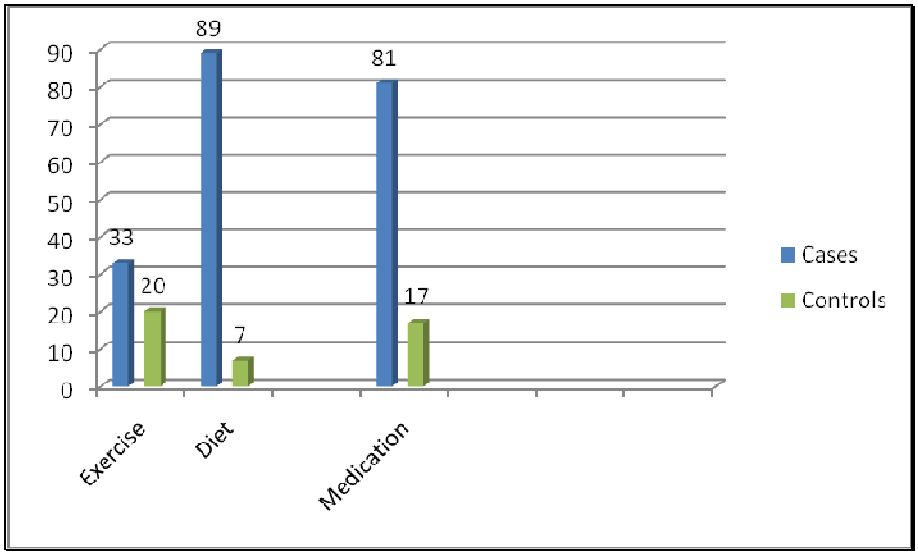


Figure 4 Prevalence of non adherence to treatment recommendations

4.6 Perceived barriers: Reasons for not adhering to treatment recommendations reported by the Cases (Non-adherers) and Controls (Adherers)

Various reasons were reported by cases and controls for failing to adhere to three diabetic treatment recommendations (medication, diet and exercise).

4.6.1 Reasons for not adhering to medication

Table 3 below summarizes the reasons for not adhering to medication reported by cases and controls

Table 3 Reasons for not adhering to medication/drugs

Reason(s)	**Non-adherence to medication/drugs**			
	Cases (N=104)	%	**Controls (N=104)**	%
Forgetfulness	81	77.9	13	12.5
Injecting self	11	10.5	3	2.8
Financial constraints	53	51	14	13.4
Travelling away from home	57	54.8	13	12.5
Too much pill burden	40	38.4	10	9.6
When I am very sick	14	13.4	7	6.7
Side effects	15	14.4	4	3.8
Presence of others make me uncomfortable	14	13.4	4	3.8

Initial bivariate analysis of the reasons for not adhering to medication indicated that forgetfulness (OR5.5; 95% CI 3.81-7.99; p<0.001), taking too much drugs per day (OR2.9; 95% CI 1.39-6.25; p=0.05), travelling away from home (for example, attending funerals, work trips, meetings OR 4.1; 95% CI 1.01-16; p =0.05) and financial constraints (OR 3.7; 95% CI 1.81-7.59; p<0.001) were significantly associated with non adherence to treatment recommendations. Similarly, Figure 4 shows a bar chart representing reasons for not following the prescribed medication recommendations.

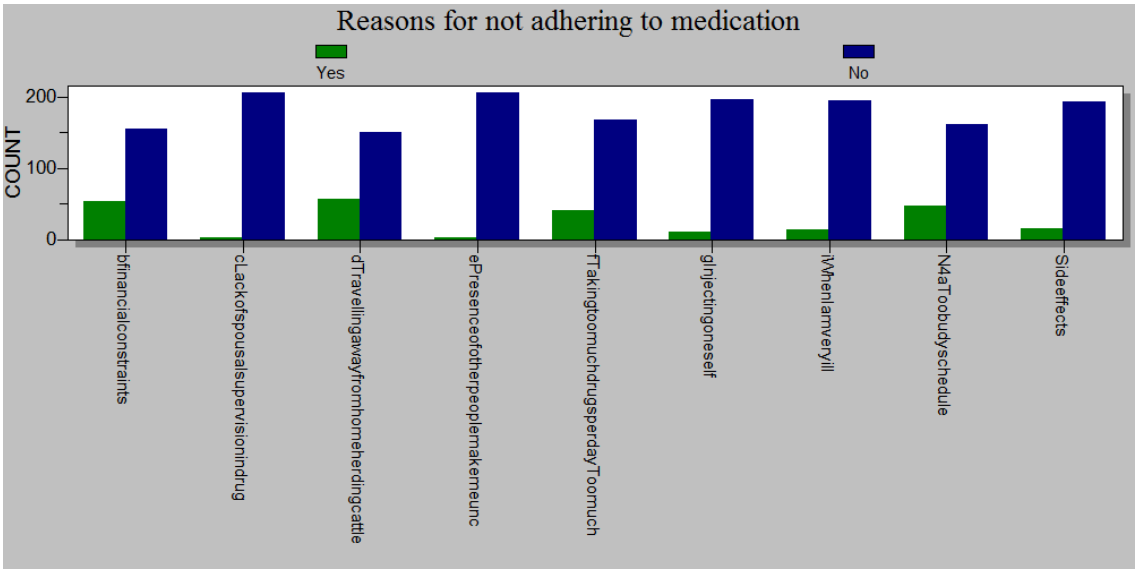


Figure 5 Reasons for not adhering to prescribed medication

4.6.2 Reasons for not adhering to diet reported by Cases and Controls

The following were the reasons reported by the Cases and Controls (N=208) for not adhering to dietary recommendations.

Table 4 Reasons for not adhering to diet reported by Cases and Controls

Reason(s)	**Non-adherence to diet**			
	Cases (N=104)	%	**Controls (N=104)**	%
Eating out(Social gatherings)	51	49	14	13.4
Financial constraints	71	68.2	23	22.1
Poor self control	23	22.1	6	5.7
Shortage of food	42	40.3	13	12.5
Always feeling hungry	26	25	11	10.5
Feeling stressed/depressed	17	16.3	5	4.8
Health problems(blindness, shaky hands)	8	7.8	1 3	12.5
Difficulty to change dietary habits	14	4.8	7	6.7
Difficulty to reveal to host that one is diabetic	4	3.8	2	1.9

When also asked if diabetic diet was affordable, seventy (67.3%) of the Cases and 17(16.3%) of the Controls reported that it was not affordable whilst 87(83.6%) of the Controls and 34 (32.7%) of the Cases highlighted that diabetic diet was affordable. However, bivariate analysis of reasons for not adhering to diet revealed that four reasons were significantly associated with non-adherence to dietary recommendations. These included: eating out at social gatherings, friends' homes, and restraunts (OR 2.7; 95% CI 2.20-3.41; p<0.001), shortage of food(OR 2.9;95% CI 1.99-4.47; p<0.005) and financial constraints (OR4.5; 95% CI 0.91-23.9 p<0.005) Similarly, Figure 6 below shows bar chart representing reasons for not adhering to diet.

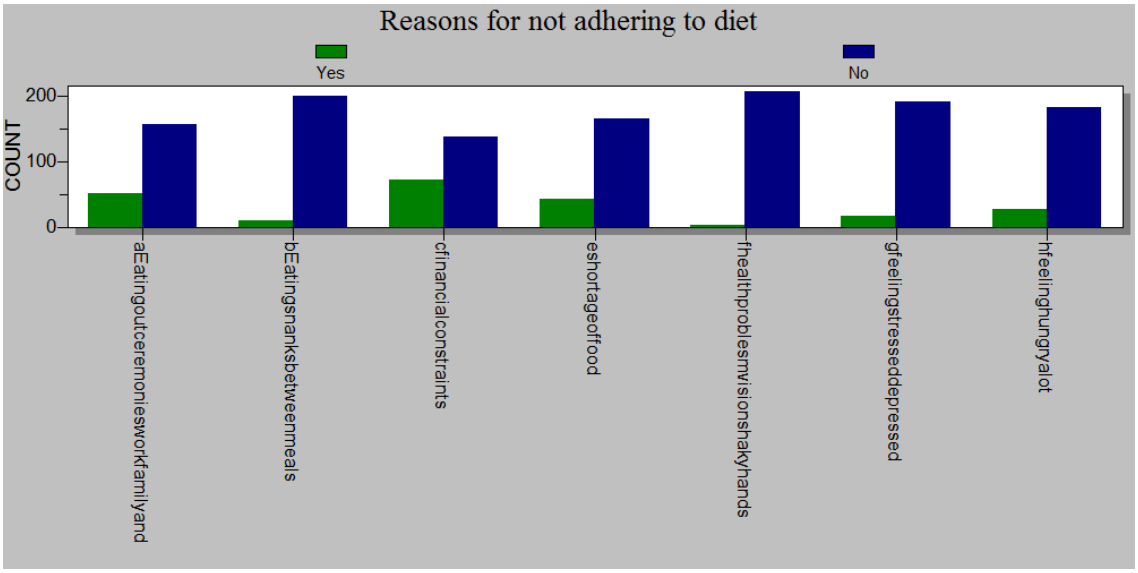


Figure 6 Reasons for not adhering to diet

4.6.3 Reasons for not adhering to exercise recommendations

Table 4.5 below shows the reasons for failing to adhere with exercise recommendations highlighted by the cases and controls.

Table 5 Reasons for not adhering to exercises

Reason(s)	**Non-adherence to exercise**			
	Cases(N=104)	%	**Controls**(N=104)	%
Lack of information	44	42.3	13	12.5
Body pain	34	32.4	11	10.5
Physical weakness	23	22.1	9	8.6
Ageing	20	19.2	8	7.6
Sickness	14	13.4	10	9.6
Too busy schedule	11	10.5	5	4.8
Exercise worsens illness	8	7.8	3	2.8
Poor motivation	5	4.8	2	1.9
Forget to exercise	4	3.8	2	1.9

The main perceived reasons for not adhering to exercise recommendations reported above were lack of information/detailed written instruction on how exercises should be done(42.3% n=44) body pain (32.5%; n=34), physical weakness (22.1%; n=23), ageing (19.2%; n=20), sickness (13.4%; n=14), too busy schedule (10.5%; n=11), exercise worsens illness (7.8%; n=8) poor motivation and forgetting to exercise. However, reasons shown to be statistically significant in bivariate analysis were: Body pain (OR 1.9; 95% CI 1.40-2.82; p<0.005) and lack of information or detailed written instructions on how to do the exercises (OR 2.3 95% CI 1.32-4.25; p=0.004).

Perceived barriers to treatment recommendations reported by Key informants

Age and the use of insulin

One of the key informants, a nurse who was in charge of the female ward reported that most elderly diabetic patients fail to adhere to treatment recommendations because they stay alone and cannot inject themselves, or can take less or too much dosage resulting in them being admitted at the hospital. She also pointed out that lack

of standardized syringes may lead to wrong dosage. Lack of syringes at local clinics was also cited to be a major problem faced by diabetic patients who live in rural areas. Local clinics were reported to have tablets only and no insulin resulting in patients travelling to Mutare city to buy medication from the hospital or from private pharmacies.

Economic hardships

Key informants also highlighted that most patients do not adhere to treatment recommendations due to economic hardships as a result they cannot afford to pay for medical care services and also not afford to buy the recommended foods.

Religion

The key informants also noted that some patients were urged to leave their medication in their churches. *They are told that if they really believe in God they have to leave their medication God can cure their diabetes,* said one of the doctors.

Dose frequency

It was also reported that patients who are both diabetic and hypertensive were more likely not adherence due to pill burden or confusion on whether they have taken the right medication or not.

Cost of drugs and other resources

The key informants also noted that diabetic drugs were expensive especially insulin and most of the patients taking insulin may not adhere. Again, insulin was reported to be in short supply and as result patients were requested to buy from private pharmacies.

Shortage glucometers for patients to test their blood sugar levels before taking meals was also cited as the major problem faced by most diabetic patients.

Storage of drugs (insulin)

Most of the patients particularly those from rural areas were reported to have storage problems for insulin which need to be stored in cool places with temperatures ranging from 2-8^{0}c. Although diabetic patients are taught how to keep their insulin (for example, in a clay pot placed on top of wet sand), one of the nurses indicated that insulin may lose its potency because temperatures may exceed the recommended temperatures or may not reach the required degree of coolness.

Pride

Pride was also reported to influence non-adherence as some patients especially those who are rich may not adhere to dietary recommendations. One of the nurses said, ‘*’One patient stated that he cannot be seen by people buying unrefined mealie-meal as this type of mealie is regarded as poor quality and associated with those who are poor and cannot afford to buy refined mealie-meal which is expensive.’*

Alcohol consumption

It was also indicated that some patients who take alcohol may forget to take their medication or may intentionally leave their medication due to the influence of alcohol. One of the key informants stated that one of the three diabetic cases who died in January 2012 died because he used to forget to take his medication after drinking beer. The wife of the deceased who was his care giver also confirmed that the patient did not want to take his medication after consuming alcohol.

Distance: Travel cost

Lastly, it was reported that diabetic patients might not adhere to treatment recommendations due to travel costs particularly those who travel long distances to the health care facilities.

4.7 Association between socio-cultural factors, social support and non-adherence: Bivariate analysis

Religious and cultural beliefs of the respondents

Figure 7 below shows the religious backgrounds of the respondents (N=208: 104 Cases & 104 Controls)

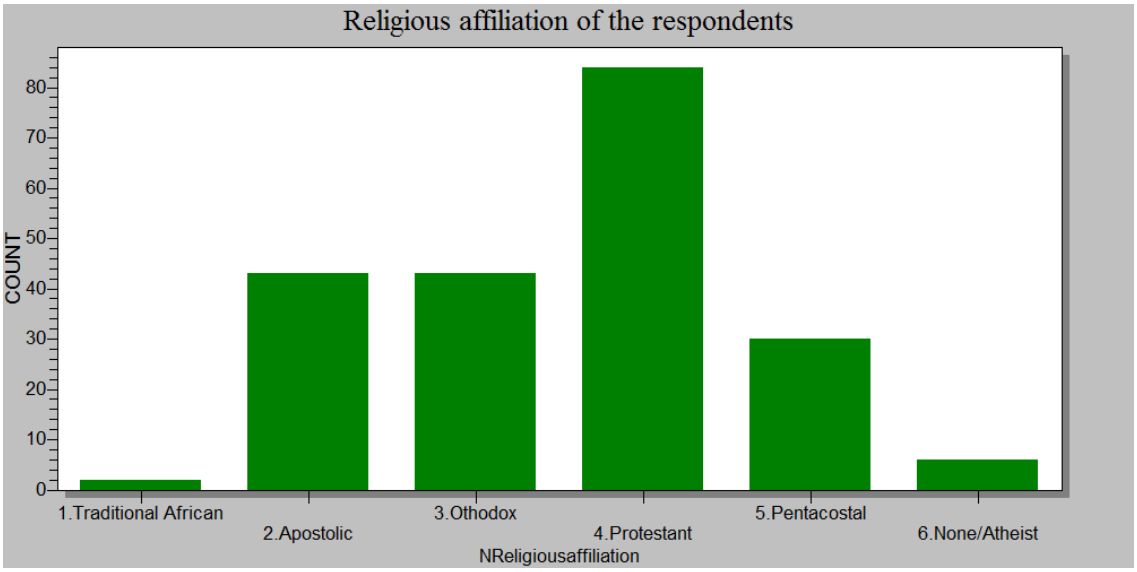


Figure 7 Religious backgrounds of the respondents

Two questions were asked participants on whether either their culture or their religious beliefs barred them from following the treatment recommendations. Majority, 97(93.2%) of the Cases (Non-adherers) and 102(98%) of the Controls (Adherers) claimed that there were no religious or cultural convictions on their

adherence behaviour. However, 7(6.7%) of the Cases (Non-adherers) and 2(1.9%) Controls reported that their culture hindered them from adhering to treatment recommendations particularly diet where culturally during social gatherings such weddings or funerals one is expected to eat food served there. The reason given was that refusal to eat may be associated with bad connotations.

Eighteen, (17.3%) Cases and 10(9.6%) Controls claimed that their religion barred them from adhering to treatment recommendations particularly to drugs and they also admitted to have consulted apostolic faith healers. These were from apostolic sects such as Masowe and Johanne Marange. 2(1.9%) Cases and 3(2.8%) Controls admitted to have had consulted traditional healers for treatment of diabetes. However, only one factor was shown to be significantly associated with non-adherence and this was consulting a faith healer (OR 1.7; 95% CI 0.77-3.87; p=0.048).

Use of alternative medicines

Although most of the respondents (93.4% n=97) denied having used some herbs to treat their diabetes, one of the interviewed doctors highlighted that some patients take herbs and stop taking their medications and come back for treatment after they have developed some complications. One of the doctors said, ''*Although patients deny that they use herbs, one patient left her medication and came back to the hospital after she had developed some cataracts in the eyes''*.

Perceived self-efficacy

Three questions were asked respondents in order to assess how they perceive their ability to follow prescribed instructions on medication, diet and exercise. 61.1% of the Cases reported that they able to follow their prescribed medications and 38.9% stated that they were less confident in their ability to follow the prescribed medication. 56.7% claimed that they could strictly adhere to their dietary plans and 43.3% indicated that they were not able to strictly follow their recommended diets and 74% reported that they exercised regularly although they had no written instructions on which type of exercise they were supposed to do. 26% reported that they did not adhere to exercise recommendations. For Controls, 84(80.7%) claimed that they were able to exercise three times per week and 16 (15.3%) reported that they were not able to exercise three times per week. 87(83.6) stated that they were able to strictly follow prescribed medications and 13(12.5%) reported that it was difficult for them to follow the prescribed medications regularly. 97(93.2%) of the Controls reported that they were able to follow the prescribed diet.

Perceived threat

A small proportion, 22.1% (n=23) of the Cases and 33.4% (n=34) of the Controls perceived the seriousness of the disease because they had members of the immediate family or friends who had died or were suffering from the same disease. They were the ones who would be taking positive initiatives to control and manage their diabetes. Those who were not aware of the seriousness of their disease were less likely to take steps to control their blood glucose levels. Interviews with patients admitted at the hospital on their perceptions about the seriousness of their disease

indicated that their worries and concerns signalled when they had developed some complications and had been hospitalized. To them, these were signs that their health was deteriorating.

Data from two key informants also revealed that patients delayed diagnosis and usually present to the hospital when they have some complications such as blurred vision, diabetic foot/ulcer, kidney failure, high blood pressure, stroke or memory loss. Table 6 below summarizes the associations between socio-cultural factors and non-adherence among Case and Control respondents.

Table 6 Association between Socio-cultural factors and non adherence

Factor/Variable		**Case**	**Control**	**OR**	**95% C.I**	**p-value**
Consulting an apostolic faith healer	Yes	18	11	1.2	0.77-3.87	**0.048**
	No	86	91			
Consulted a traditional healer	Yes	2	3	0.65	0.10-3.99	0.39
	No	102	101			
Ever used herbs to treat diabetes	Yes	10	11	0.62	0.23-1.67	0.24
	No	94	93			
Religion as a hindrance to adherence	Yes	18	4	2.7	0.82-9.03	0.75
	No	86	100			
Consistently receiving support from family	Yes	69	87	0.41	0.21-0.79	**0.005*** **
members	No	35	17			
Culture as a hindrance to adherence	Yes	7	3	3.6	0.73-17.9	0.08
	No	97	101			

Being a member of the Diabetic Association	Yes	22	50	0.27	0.15-0.51	**0.002*** **
	No	82	54			
Perceived benefits	Yes	103(99)	101(98)	2.03	0.18-22	0.49
	No	1(1)	3(2.9)			

4.8 Facilitators of adherence to treatment recommendations

Perceived benefits

The vast majority of Cases (99%) and Controls (98%) agreed with the statement that there are some benefits for adhering to treatment recommendations (medication, diet and exercise) and they believed that taking their prescribed treatment plans would '*help them to stay well'*, '*'reduces chances of developing serious complications''*, '*keep their blood sugar and diabetes under control, feeling better physically and also have longer life span.*''

91 (87.5%) of the Controls and 70(67.3%) reported that diet and exercise help to control blood sugar levels and to reduce complications associated with low blood sugar(hypoglycaemia) and hyperglycaemia. However, there was no significant association between believing that there were benefits for adhering to treatment recommendations and non-adherence.

Social support

There was a marginal difference between the Cases and the Controls with regard to their sources of social support. 53.4 % (n=55) of the Cases and 50% (n=52) of the Controls received social support from their children and this included financial, material, moral and emotional support, 37.9% (n=39) of the Cases and 36.5%(n=38) of the Controls reported that they were supported by the spouses, 2.9% of both Cases and Controls got support from distant relatives, 3.9% other sources such as Non Governmental Organizations and one reported that she got support from friends. 52(51%) of the Controls compared to only 22(21.1%) of the Cases were members of the Diabetic Association for Manicaland province. Figure 8 below shows a bar chart representing various sources of social support reported by the participants.

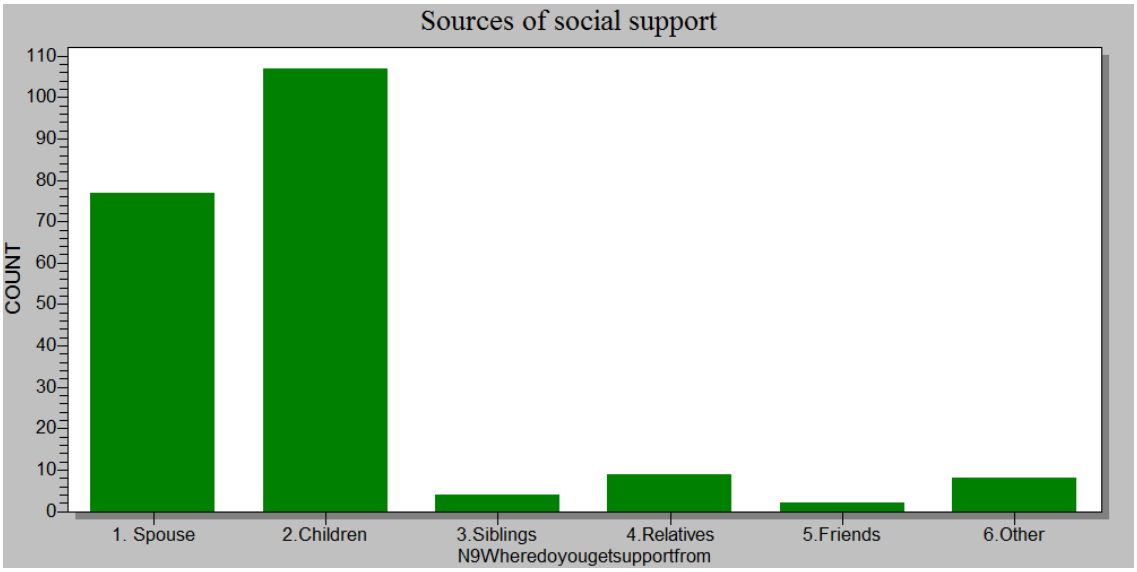


Figure 8 Sources of social support

Bivariate analysis of the relationship between social support and non-adherence revealed that consistently receiving social support from members of the family (OR

0.41; 95% C.I 0.21-0.79; p ≤ 0.05 and being a member of the Diabetic Association (OR 0.27; 95% C.I 0.15-0.51; p≤ 0.0002) had a protective effect against non-adherence to treatment recommendations.

4.9 Association between Disease / therapy related factors and non-adherence

Table 7 below shows the association between disease or therapy related factors and non-adherence.

Table 7Association between disease/therapy related factors and non adherence

Variable		**Cases N=104**	**Controls N=104**	**OR**	**95% C.I**	**P-Value**
1.Comorbidities	Yes	88	81	1.9	0.91-4.04	**0.05*** **
	No	16	23			
2.Duration of diabetes treatment						
a) 1-5 years	Yes	57	53	1.9	1.40-2.82	**0.004*** **
	No	47	51			
b) 6-10 years	Yes	26	24	0.76	0.49-1.18	0.13
	No	78	80			
c) > 10 years	Yes	83	77	0.56	1.85-5.59	**0.001*** **
	No	21	27			
3.**Treatment modality**						
a) Insulin	Yes	12	12	1.0	0.42-2.34	0.58
	No	92	92			
b) Tablets	Yes	84	83	1.1	0.50-2.37	0.08
	No	20	21			
c) Both insulin & tablets	Yes	8	9	0.31	0.08-1.20	0.06

	No	96	95			
4.**Number of drugs taken**						
a)One	Yes	17	13	0.89	0.57-1.39	0.60
	No	87	81			
b)Two	Yes	82	69	1.2	0.48-3.46	0.82
	No	22	35			
c)Three or more	Yes	90	89	1.4	0.80-2.40	0.31
	No	14	15			
5.Dose frequency per day						
a) Once	Yes	2	3	1.20	0.72-2.60	0.42
	No	102	101			
b) Twice	Yes	35	33	0.74	0.42-1.31	0.19
	No	69	71			
c) More than twice	Yes	67	68	0.60	0.32-1.13	0.07
	No	37	36			
6.Side effects	Yes	15	4	1.21	0.68-2.17	0.52
	No	89	100			
7.Complexity of drug regimen	Yes	`41	31	1.0	0.42-2.34	0.58
	No	58	73			

****Association is significant*

Co-morbidities

A question was asked if respondents suffered from other diseases and 87.1% (n=88) Cases and 77.9% Controls were suffering from other diseases. Bivariate analysis indicated that the presence of two or more co-morbidities was statistically significant and associated with gradual increase in non-adherence to treatment recommendations

(OR 1.9; 95% C.I 0.91-4.04; P< 0.05). The most frequently reported co-morbidities were hypertension, asthma, ulcers and HIV/AIDS.

The graph, Figure 9 below shows the frequently reported co-morbidities.

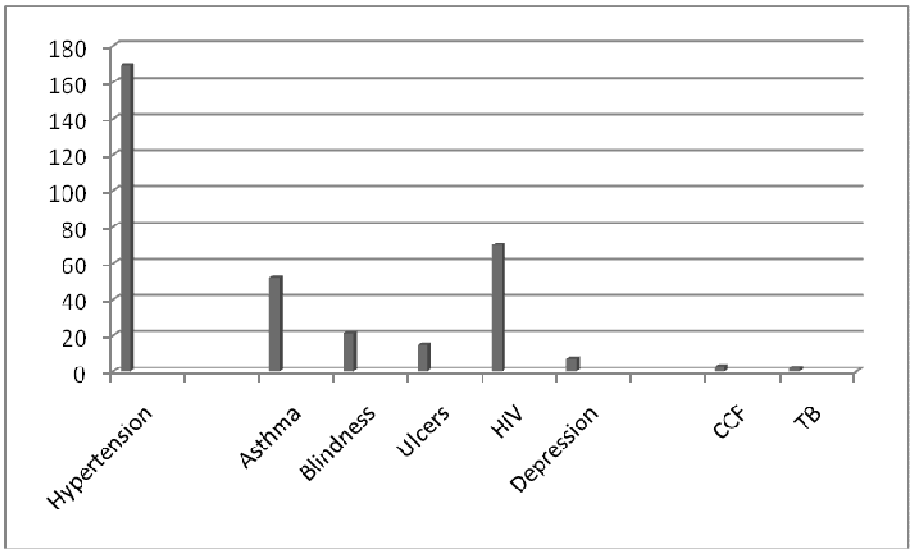


Figure 9 Co-morbidities reported by cases and controls

Dose frequency per a day

There was no significant association between the frequency of doses per day and non-adherence (OR 1.3; 95% C.I 0.0.72-2.60).

Duration of treatment for diabetes

Bivariate analysis indicated that there was a statistically significant association between shorter duration of treatment for diabetes and non-adherence to dietary recommendations (1-5 years OR 1.9; 95% CI; 1.40-2.82; p<0.004). Longer duration of treatment of diabetes was associated with adherence to two diabetes-care recommendations particularly medication and diet(OR 3.2; 95% C.I 1.85-5.59; p < 0.001).

Treatment modality

There was no significant association established between type of treatment taken for example, oral antigens, insulin, both insulin and oral tablets and non-adherence.

Side effects

Only small proportions, 15 (14.4%) of the non-adherers and 4 (3.8%) of the adherers reported that they experienced adverse drug events due to anti-diabetic drugs such as Metformin and Glibenclamide). 7(6.7%) associated the side effects to Metformin, 5(4.8%) attributed the adverse events to Glibenclamide and 3(2.8%) were not sure of the cause.

Complexity of drug regimen

No significant association was found between complexity of drug regimen and non-adherence (OR 1.0; 95% CI 0.42-2.34; P=0.58).

Number of drugs taken

86.5% (n=90) of the Cases and 76.9% (n=80) of the controls were on treatment of other co-morbidities. Of the cases 91.1% (n= 82) were on blood pressure treatment, 4.4% (n=4) HIV/ART treatment, 2.2% (n=2) were taking some pain killers and 2.2% (n=2) were on Tuberculosis (TB) treatment. For controls, 69 (86.3%) were on blood pressure treatment, 7(8.8%) were taking some pain killers, 3(3.8%) were on HIV treatment and one was on fungal treatment. However, there was no significant association between number of drugs taken and non-adherence. Figure 10 below shows other drugs other than anti-diabetic drugs which were taken by the respondents.

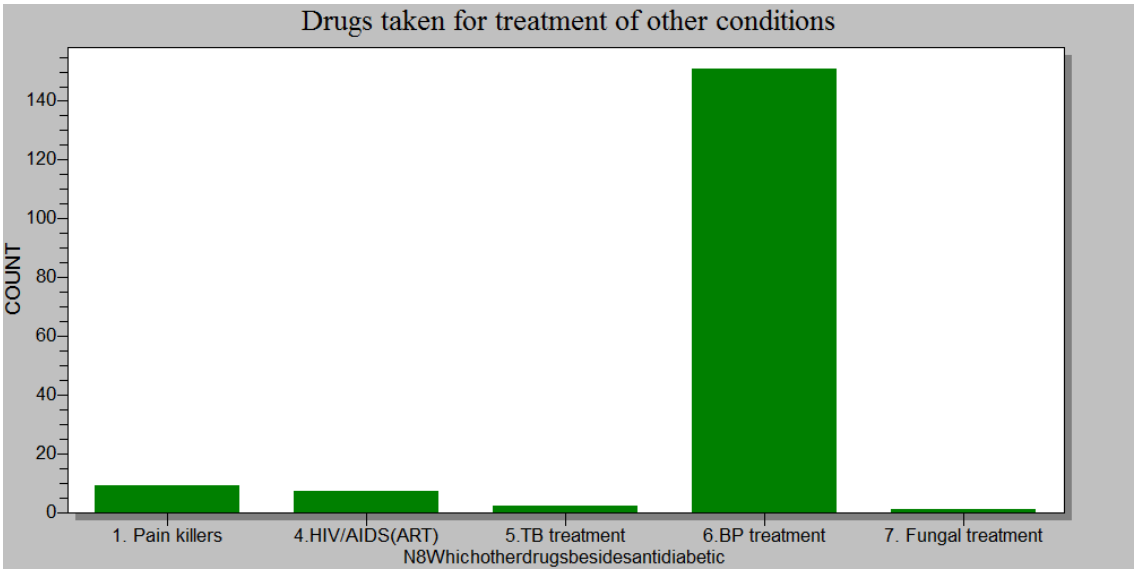


Figure 10 Drugs taken to treat other conditions

4.10 Association between health service factors and non-adherence: Bivariate analysis

Availability of drugs

When asked about where they got their anti-diabetic drugs from, 72.5% (n=151) of both cases and controls indicated that they got all their drugs at Mutare Provincial hospital pharmacy, 20.6% (n=43) cases and controls reported that they obtained some of their medication from private pharmacies and some from Mutare Provincial hospital pharmacy. These were those patients who were on both insulin and oral treatment who obtained tablets such as Metformin and Glibenclamide at MPH pharmacy and had to sometimes buy insulin from private pharmacies when not available at MPH. Data from 10 of the 16 key informants revealed that insulin and some anti-hypertensive drugs were always in short supply at the hospital and in most cases patients were requested to buy from private pharmacies in town. Two case respondents reported that they obtained their medication from their local clinics in town. Those from rural areas indicated that there were no anti-diabetic drugs in rural

clinics. However, those who got some of the medications at MPH were 2.0 times likely not to adhere to their medications compared to those who got all their medications (OR1.9 ;95% CI 1.22-4.38; p=0.004).

Affordability of medical services

95% of the non-adherers indicated that services were not affordable as it was not easy for them to pay consultation and medication fees. 11(10.5%) reported that they had managed to raise $6 consultation fees in order to have their medical cards stamped and go back home unattended. Further probing into how they would get their medication revealed that they would wait until they get the money then would buy from private pharmacies. Only 5% of the Case respondents reported that they could afford to pay for their medical services with easy. It was further found that 82 (91.1%) of the cases who could not afford had co morbid hypertension (Blood pressure) and anti-hypertensive medication were very expensive especially from private pharmacies. Data from one of the specialist doctors indicated that the services were not affordable to most of the patients and he reported that, *'It is not easy for most of the patients to pay for the services especially those with diabetic foot and need skin grafting. Most of them are not employed and are suffering from the disease which requires regular monitoring.''*

Health education

100% of both Cases and Controls reported they had attended health education sessions. Three questions were asked to assess if the respondents had ever received: detailed instructions about how they were supposed to administer their medication, detailed written instructions regarding healthy dietary habits and written program on

how to exercise. Most of the respondents, 99% (n=103) of the Cases and 98% (n=102) of the Controls highlighted that they had received detailed instructions on how to administer their medications. 92.2% (n=100) of the Cases and 98% (n=102) of the Controls reported that they received detailed written instructions regarding healthy dietary habits from the health care workers (See Appendix VII: MPH Diabetic Diet Sheet). Surprisingly, only 22(21.1%) reported that they had attended more than two sessions in the past six. 72(69.2%) of the Controls had attended more than two health education sessions in the past six months prior to this study. Having attended more than two health education sessions was protective against non-adherence to treatment recommendations (OR 0.40; 95% CI 0.17-0.53; p=0.003). However, health education is mostly provided by nurses. When asked if they educate their patients on how they should take their medications, one of the interviewed doctors indicated that he had no time for educating the patients as the queue of patients requiring to be served would be long due to shortage of doctors and time constraint. As a result they leave everything to nurses and pharmacists who distribute the drugs to the patients. This was also confirmed by one nurse who reported that, *Shortage of staff makes it difficult for us to discuss at lengthy with diabetic patients as other patients with other conditions will be waiting to be served.*''

Waiting time

Although no statistically significant association was established between waiting time and non-adherence, waiting time was the major issue that came out strongly from the participants. 46.1% (n=48) Cases and 39.4% (n=41) Controls reported that they were not happy with the time they wait to be served. One male respondent from

the Case group said, '*I do not stay in Mutare, I travel all the way from Honde valley and I wake up very early so that I beat the queue but I spent the whole day waiting to be served. I think it's better to buy my medication from private pharmacies than wasting my time coming here.''* However, 16.3% (n=17) of both Cases and Controls reported that nurses were very efficient but doctors were always not available when they want to see them. They had to wait for 3-4 hours for them to come and serve them.

Patient-provider communication

100% reported that communication with nurses and local doctors was done using their first language, Shona. However, English was used when communicating with specialist doctors and expatriate doctors from other countries. Due to English language barrier among most of the elderly patients, communication was either through the use of a nurse or a caregiver who usually was a member of the family. These are supposed to interpret what the doctor says to the patient. Non-participant observer of how expatriate doctors from non-English speaking countries communicate with their patients highlighted that communication was really a problem as these doctors may fail to clearly explain what the patients should do. In some cases nurses ended up telling patients what they thought the doctors had said. This might compromise the patient's adherence although no significant association was established between patient-doctor communication and non-adherence to treatment recommendations.

Time last seen by a doctor/health worker

62.5% (n=65) Cases and 68.3% (n=71) Controls reported that it was less than 3 months since they were last seen by a doctor. 38 (36.5%) of the Cases 33(31.7%) of the Controls reported that it was more than 3 months since they were last seen by a doctor. No statistically significant association was found between time last seen by a doctor or by a health workerand non-adherence to treatment recommendations.

Staff attitude

Majority of the respondents, 71.2% of the Cases and 79.7% of the Controls expressed their satisfaction about the way they were treated by health care workers and they regarded it as,'' *Excellent''*. One female respondent from the Control group reported that ,*''They are good, they care for us and they always make sure that diabetic patients are the first to be served because of our condition, if we wait for a long period of time we can faint'*. Non-participant observation by the researcher also confirmed that patients were welcomed in a friendly way, were free to express their concerns and asked questions on issues they needed some clarifications. For example, during health education sessions, patients were given the opportunity to ask questions and the healthcare workers answered the questions clearly.

Figure 11 below shows how the respondents rated the attitude of health care workers towards diabetic patients.

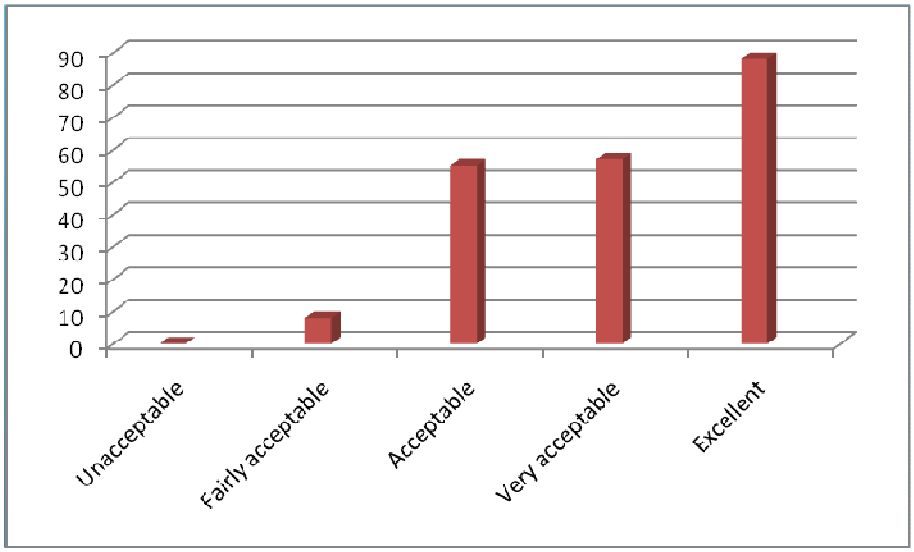


Figure 11 Attitude of health care workers towards diabetic patients

Bivariate analysis indicated that health service factors which showed a significant association with non-adherence to treatment recommendations included: Availability of some or none of the drugs (OR 1.9; 95% CI 1.22-4.38; p=0.004), Cost/affordability of drugs (OR 1.7; 95% CI 1.32-2.98; $p \leq 0.004$) and distance of 51-100km of home from health care facility (OR 2.5; 95% CI 1.15-5.50; $p \leq 0.02$). Ever attended health education (OR 0.40; 0.17-0.93; $p < 0.003$) and having attended more than two health education sessions were protective against non-adherence.

Table 8 below summarizes the association between health service factors and non-adherence.

Table 8 Association between health service factors and non adherence

Variable	OR	95% C.I	P-Value
1.**Waiting time**			
< 1hour	0.97	0.26-3.53	0.96
1-2 hours	0.75	0.23-2.44	0.63
3-4 hours	1.0	0.31-3.39	0.96
>5 hours	0.62	0.15-2.58	0.51
2.**Communication using 1st language**	1.2	0.42-3.14	0.48
3.**Time last seen by health worker**			
< 3months	1.29	0.72-2.31	0.37
>3months	3.1	1.72-5.59	0.009
4.**Cost of drugs/affordability**	1.7	1.32-2.98	**0.004*** **
5. **Availability of drugs**			
a) All drugs			
b) Some of the drugs or none	1.9	1.22-4.38	**0.004*** **
6**. Distance of home from health facility**			
a) Below 15km	0.80	0.30-2.12	0.66
b) 16-50km	1.5	0.70-3.4	0.27
c) 51-100km	2.5	1.15-5.50	**0.02*** **
7.**Health education**			
-Ever attended health education	0.40	0.17-0.93	**0.003*** **
-Number of sessions attended			
a) None or one	1.3	0.72-2.60	0.20
b) Two or more	0.58	0.31-1.07	**0.05*** **

4.11 Multivariate analysis: Logistic regression

Logistic regression model was used in order to adjust for possible confounding variables. Factors which were found to be independently associated with non-adherence were: financial constraints (OR 7.4; 95% CI 3.20-16-93; p<0.001), travelling away from (OR 2.8;95% CI 1.70-24.71; p<0.001), eating out (OR 4.4; 95% CI 1.81- 11.13; p=0.001, lack of detailed information on how to exercise(OR 2.3; distance from health facility (OR 2.5; 95% CI 1.15-5.50; p =0.02). Those who could not afford some of the drugs were 3.7 times more likely not to adhere to medication recommendations compared to those who afford all the drugs (OR 3.7;95% C.I 1.81-7.59; p=0.014).

However, receiving support from family members (financial, material, emotional or moral OR 0.41; 95% CI 0.20-0.8; p= 0.013), being a member of the Diabetic Association (OR 0.27; 95% CI0.15-0.53; p=0.001), longer duration of diabetes treatment (more than 10 years OR 3.1 CI 1.70-5.71; p≤ 0.001), and having attended more than two health education sessions in the past six months (OR 0.40; 95% CI0.17-0.93; p=0.003) appeared to be protective factors against non-adherence to treatment recommendations. Other factors were not retained after they were fitted into the logistic regression model and these include shorter duration of treatment for diabetes and socio-cultural factors such consulting apostolic faith healers and not consulting a traditional healer. Results of logistic regression analysis are shown in Table 9 below.

Table 9 Logistic regression model on possible predictors of non adherence

Variable	OR	95% C.I	P-value
Social support			
Receiving support from family members	0.41	0.20-0.82	0.013
Being a member of the Diabetic Association	0.27	0.15-0.53	0.001
Reasons for non-adherence to drugs, diet &exercise			
Financial constraints	2.8	1.70-24.71	0.000
Travelling away from home(trips, funerals, work)	7.4	3.20-16.93	0.001
When very ill	4.8	2.13-10.70	0.001
Eating out	4.4	1.81-11.13	0.001
Shortage of food	3.2	1.75-5.59	0.001
Too busy schedule	2.5	1.21-5.20	0.017
Lack of information/detailed instruction on exercises	2. 6	1.19-5.71	0.01
Disease and therapy related factors			
Duration of diabetes treatment(> 10 years)	3.1	1.70-5.71	0.001
Health services factors			
Distance			
51-100km	2.5	1.15-5.50	0.02
Affordability of drugs	3.7	1.81-7.59	0.001
Health education			
Attended two or more sessions in the past 6 months	0.40	0.17-0.93	0.003

CHAPTER FIVE: DISCUSSION, CONCLUSION & RECOMMENDATIONS

5.1 Introduction

This chapter discusses the findings of the study using the objectives, research questions, conceptual framework and the reviewed related literature. Critical analysis and discussion of the findings noted in the previous chapter are highlighted in this chapter. Again, these findings would be compared with previous research based on literature in order to demonstrate relevant important aspects of the results including similarities, differences and deviations. Conclusions were drawn basing on the evidence based point of view and also recommendations were derived from the findings, discussions and conclusions.

5.2 Prevalence of non-adherence to medication, diet and exercise

Rates of non-adherence to treatment recommendations in this study are consistent with that reported in other studies(Bisiriyu 2007, Kalyango et al 2008, Rowley 1999) where non-adherence to diet and exercise ranged from 35%-75%. In this study, 43.3% were not adhering to diet, 38.9% were not adhering to drugs/medication and 26% were not adhering to exercise. This level of non-adherence to diet and medication in this study is quite high and main barrier cited by the respondents was financial constraints. This was almost similar to the study done in China by Lam et al (2007) where a non-adherence rate of 37% was reported. However, it is assumed that the level of non-adherence found in this study is an underestimation of the true prevalence of non-adherence in this population. This is mainly because the use of self-reports to assess adherence and non-adherence. This approach may have

overestimated the level of adherence and may also have underestimated the level of non adherence.

Non-adherence rate reported in this study was lower than that reported in previous studies where about 50% was reported in developed countries and these also used self-reports. However, non-adherence rate found in this study was higher than those found in other studies done by (Kalyango et al 2008, Uganda, Bisiriyu 2007, Botswana, Kumar Praveen and Halesh 2010, Malaysia, 28.9%). Other studies assessing non-adherence to diabetes treatment have also found the prevalence ranging from 23% to 77% (Ciechanowski et al 2001, Grant el 2004, Rubin et al 1999).

The reasons for these differences might also be related to the difference in methods used for assessment. Pill counting methods were used in other studies while this study used self-reported omissions of drugs and this may have underestimated the true prevalence of non-adherence.

This study also found out that respondents who adhered to their medication, diet and or exercise recommendations achieved better glycaemic control as compared to those who were not adherent. As a result, those respondents who did not adhere to their medications had significantly higher HbA_1c levels than those who adhered. The HbA_1c levels for those who were adherent ranged between 4.0 to 8.0% whereas for those who were not adherent to their HbA1c levels ranged between 10 to 33%. This was in line with the study done by Chua and Chan (2011) which reported higher HbA_1c levels among those patients who did not adhere to treatment recommendations and optimal HbA1c levels among patients who were adherent.

5.3 Factors associated with non-adherence

Quite a number of factors independently associated with non-adherence to treatment recommendations (medication, diet and exercise) were identified in this study.

5.3.1 Socio-demographic characteristics of respondents

The majority of respondents in this study were females (150 females and 58 males) and this is consistent with the studies by Caballero in 2004 in Mexico city, where 112 were females and 64 were males, Bisiriyu 2007 study at Extension II clinic in Gaborone, Botswana where 199 were males and 239 were females and also Malaysian study by Chua and Chan which comprised of 180 males and 225females.

Similar to the findings of other studies (Bisiriyu 2007) these results also show that patients who adhere to medication, diet and regular exercise had a better control of blood pressure than those who are non-adherent. In line with other studies was the finding that suboptimal blood sugar control was significantly higher in those who missed medication refill dates, did not follow a recommended diet and did not take regular exercise.

In this study, it was found that there was no significant association between socio-demographic characteristics of the participants and their non-adherent behaviour towards treatment recommendations. These findings are consistent with studies by Jackson (2010) where no socio- demographic variables were significantly associated with non-adherence. This is however in contrast with quite a number of studies which revealed significant association between socio-demographic characteristics

and non-adherence (Kalyango et al 2008, Bisiriyu 2007, Rasaq 2009, Harris 1993, Kumar and Halesh 2010). For instance, a study done by Uchenna et al (2010) in Nigeria, indicated that socio-demographic characteristics such as female gender (OR 3.8; 95% C.I 20.00-64, age 51-89(OR 9.6; 95% C.I 6.02-15.58; p<0.0001), single marital status (OR 3.2; 95% C.I2.05-5.15; p<0.0001), secondary or tertiary education (OR 0.071; 95% C.I 0.04-0.12; p< 0.0001) and being employed(OR 4.4; 95% C.I 2.26-8.74; p< 0.0001) were significantly associated with medication non adherence. The difference between the findings of this study and that of Uchenna's may be due to the methods used to collect data.

However, lack of significant association between socio-demographic factors and non-adherence in this study might be attributed to small sample size compared to the sample sizes of the previous studies, 208 in this study as compared to 370 used by Uchenna et al (2010), Kumar and Halesh (2010) where the sample size was 804 and Khattab et al (2008) also used a sample of 917(455 males and 462 females. Drug non-adherence had been shown in previous studies to be associated with younger and advanced age, increased number of doses taken per day and increased types of drugs taken. This study was not able to reveal such findings possibly because of the efforts being taken by the health care workers to improve service provision and drug adherence through health education sessions.

Knowledge about diabetes and its complications

In this study, patients who were aware of the risk factors associated with the development of diabetes such as family history, age and eating food rich in saturated fats and were also aware of the diabetes complications, demonstrated better

adherence to treatment recommendations as compared to those with poorer knowledge. However, these findings are in contrast with the findings of study done by Wens et al (2005) where no association was reported between higher knowledge levels and non-adherence.

5.3.2 Socio-cultural factors and non-adherence to treatment recommendations

Perceived benefits of treatment recommendations

This study established that most of the respondents perceived medication, diet and exercise as significantly important for control and management of diabetes. Possible explanations are that patients are counselled and educated about diabetes as soon as they are diagnosed with the disease. In addition, those who participated in this study had a relatively high educational level. For example, 91.3% cases and also 91.3% of the controls had attained a form of education with primary as minimum.

Social support

The results of this study indicated that receiving support from members of the immediate family was associated with adherence to treatment recommendations. This was similar to the studies conducted by Uchenna et al (2010), Tiv (2007), Glasgow (1988), Kalyango et al (2008) and Bisiriyu (2007).

Support group

This study revealed that being a member of the Diabetic Association was associated with higher rates of adherence. Both cases and controls reported the benefits of being a member of the support group as, ''*provision of emotional and moral support*, *enhancement of copying skills, better regimen and dietary adherence and improved*

*glycaemic contro*l.'' These findings are similar to the findings of the Delameter et al 1993, Montague 2002 and Yung et al 1998.

Talking alternative medicines

Taking alternative medicines such as herbs was not significantly linked with non-adherence. These results are similar to a study by Kalyango et al (2008) where no significant association established between using alternative medication and non-adherence.

Perceived self-efficacy

The results of this study highlighted that people who were more adherent had a higher level of confidence in their ability to follow medical recommendations and expect meaningful positive consequences for adherence. Again, they had a more positive relationship with their health care providers. These results are similar to the findings study conducted by Ciherman (2011).

5.3.3 Disease and treatment related factors associated with non-adherence

Existence of co-morbidities

In this particular study, bivariate analysis indicated there was a significant association between co-morbidities and non-adherence. This is in contrast with the study by Hashmi et al (2004) which reported no association between co-morbidities and adherence. In this study complications which were most prevalent among the patients included blindness (25%), diabetic foot (8.6%), leg amputations (11%), memory loss (1.9%. It could be that those who were suffering from these

complications became adherent after they had developed some complications as a result of non-adherence to the prescribed recommendations.

Number of drugs taken and route of drug administration

In this study no significant relationship was found between route of drug administration (oral tablets or insulin) and non-adherence. This means that this factor did not predict non-adherence among these case and control respondents. This is similar with the studies by Kalyango et al (2008) and Grant et al (2004). This was different from the study conducted by Chua and Chan (2011) where a significant association was found between combination of oral tablets and insulin and lower adherence to medication (OR 3.1; 95% CI 1.7-5.7; $p<0.001$).

Types of drugs taken and dose frequency

In this study, no significant association was found between types and number of drugs and non-adherence. The finding is similar to the results in other studies (Kalyango et al 2008, Grant et al 2004). However, this was in contrast with other studies which indicated that the types of drugs taken and the frequency per day appeared to have an influence on non-adherence. For example, a study by Khattab et al (2008) revealed that compared to patients who were on oral anti-diabetic agents alone, those who were on other treatment modalities were more likely not to adhere. In the same study, insulin in combination with oral anti-diabetic agents was associated with odds of poor glycaemic control (OR=7.50, $p\leq 0.05$). Another study conducted by Lam et al (2007) indicated that the use of respiratory drugs (inhalers)

by those patients who were also using anti-diabetic regimens was associated with drug non-adherence.

Duration of treatment for diabetes

This study indicated that shorter duration of treatment for diabetes (1-5 years) was significantly associated with non-adherence to dietary recommendations (OR 1.9; 95% CI 1.40-2.82; $p \leq 0.004$). Longer duration on treatment for diabetes was associated with adherence to medication and diet. These findings are in agreement with the findings of the study conducted by Patino et al (2004). However, this was not similar to the findings of the study done by Khattab et al (2010) which showed that longer duration (more than 7 years) was associated significantly with poor glycaemic control. Shorter duration of treatment for diabetes in this study may be associated with limited behaviour change particularly lifestyle modification whereby an individual is supposed to change his/her life style. For example, one is expected to adopt new dietary habits and reduce sedentary life style and be physically active.

Again, those with shorter treatment duration may be tempted to continue with their usual lifestyles. On the other hand, longer duration of diabetes treatment may negatively affect physical activity and diet. A study done by Glasgow et al (1987) found that longer duration of diabetes was associated with non-adherence to diet and exercise. It was reported that patients who had had diabetes for 10 years or less reported greater energy expenditure in recreational activities and exercising on more days per week than those with a longer history of diabetes. Patients with longer

history of diabetes in the same study also reported eating more inappropriate foods, consuming a greater proportion of saturated fats and following their diets less well.

Side effects

Although respondents reported experiencing side effects such as diarrhoea, headache, dizziness, no significant association was found between side effects and non-adherence. The small proportion of respondents who reported experiencing side effects might have been the reason why a significant association was not found. However, this was seen as inconviences and not necessarily linked to non-adherence. These findings are similar to the results of the study carried out by Kalyango et al (2008) at Mulago hospital in Uganda where no significant association was established between adverse drug events and non-adherence. This finding is in contrast with other studies in which patients who experienced side effects were more likely not to adhere to treatment (Chua and Chan 2011, Grant et al 2004).

A Malaysian study done by Lam et al (2007) also reported that patients' self-perceiving drug effects was associated with non-adherence(OR 2.5; 95% CI 1.2-5.2; p=0.017). In these studies the proportion of patients experiencing side effects was bigger than the one found in this study, 26.5% as compared 14.4% in this study. However, the effect of self-perceived adverse effects on non-adherence should be not be overlooked as it appears to be a risk factor for non-adherence and requires attention in future studies.

Complexity of drug regimen

Complexity of drug regimen was not confirmed in this study as potential risk factor associated with non-adherence. This finding is similar to the finding of the study done Kalyango et al (2008) where no significant relationship was established between complexity of regimen and non-adherence. This contradicts with findings of other studies which indicated an association between regimen complexity and non-adherence (Lam et al 2007). Their study indicated that a complicated drug regimen was an important risk factor associated with drug non-adherence (OR 7.4; 95% CI3.2-16.9; $p<0.001$).

5.3.4 Barriers /Reasons for non-adherence to medication diet and exercise.

Although most of the participants perceived medications, diet and exercise as important to achieve and maintain good glycaemic control, the majority reported a wide range of reasons for not adhering to prescribed treatment recommendations. The major reasons reported for non-adherence to medication were financial constraints, travelling outside home and forgetfulness. For diet the most cited reasons were eating out for instance, in friends' homes and restraunts, financial constraints, social gatherings such weddings, birth day parties, funerals and other forms of traditional ceremonies, feeling stressed or depressed, shortage of food leading patients to eating whatever food available, difficulty in following a diet regimen different from the rest of the family, poor self-control and always feeling hungry. The main reasons reported for non-adherence to exercise included lack of written detailed instructions on how to exercise and types of exercise recommended for particular ages and for those with co-morbidities such as asthma and ulcers, sickness

and chest pain, criticism by others, too busy schedules, exercise causing physical weakness and exacerbating illness.

These findings are consistent with various studies on barriers of adherence to treatment recommendations (Ary 1986, Osterberg and Blaschke 2005, Aljasem2004, Bisiriyu 2007, Kalyango et al 2008, Ciechanowski et al 2000,Montague 2000, Uchenna et al 2010, Ciherman 2011, Glasgow et al 1997). In these studies, financial constraints, direct and indirect costs associated with a prescribed regimen, restricted access to therapy and the costs of the recommended diet were reported to have an effect on the patients' adherence to treatment recommendations.

5.3.5 Health services factors and non-adherence to treatment

Distance of home from health care facility

In this study, it was found that there was a significant association between distance and non-adherence particularly for those patients living in areas situated 51-100km from Mutare city. This may be partly because of financial constraints as patients are supposed to pay for transport to and from the health care facility. This is equally true for patients from rural areas that face challenges such as access to public and reliable transport. In addition, there are no anti-diabetic drugs in most clinics in rural areas and as a result, patients from these areas may have to travel to urban areas where drugs are available and also to consult specialist doctors. This finding is consistent with the study done by Karter (2000) where longer distance from health care facility was found to independently associated with non-adherence.

Affordability of drugs

At Mutare Provincial hospital there is a fee exemption policy for consultation and medical care services for clients aged 65 years and above, whereas those aged below 65 are not exempted from paying. In order to be exempted, those aged 65years and above are expected to produce their identity cards for confirmation. In this study 64% (n=67) of the Cases and 53.8% (n=56) Controls were supposed to pay for consultation fees and for medication. The amounts paid ranges from $12-$40 depending on the number and type of drugs. In this study, patients who could not afford some or none of the prescribed drugs were more likely not to adhere because of the failure to buy medication from private pharmacies if they did not get them from the hospital. This finding is in line with the results of the study carried out by Kalyango et al (2008). Although those who were exempted from paying for medication get them for free when they were available, sometimes they were not sufficient enough to cater for the duration over which the drugs have been prescribed.

Health education

Health education attendance and the number of sessions attended in a period of six months were significantly associated with better adherence to medication, diet and exercise. Patients, who attend health education sessions tend to understand their regimens better, follow their dietary plans and exercise more regularly because generally health education sessions usually involve advice to patients about diet, medication administration and physical activity, self-monitoring of blood glucose and general self-care for diabetic patients. At Mutare Provincial hospital, the researcher observed that the health education sessions were conducted early in the

morning whist patients were waiting to be served. The number of health education sessions attended is important because patients need to be reminded from time to time. Longer time period may be a risk factor for non-adherence as patients tend forget what they have been taught due to lack of reinforcement. The importance of health education has also been reported in other studies (Kalyango et al 2008, Grant et al 2004, Rubin et al 1999).

Patient waiting time, patient-provider communication and non adherence

Although patient waiting time and patient provider communication were not significantly associated with non-adherence, they are important factors as patients who perceive to have waited for longer periods may intentionally miss their next review dates because they perceive visiting health care facilities as sheer wastage of time. In this study 46.1% Cases and 40.3 Controls reported that they waited for 3 or more hours. A study carried out by Nyambura (2004) indicated that longer waiting periods may have an influence on non-adherence. Again, patient- provider communication is important as this may help patients to understand the instructions given by the health workers.

In this study, it was noted that nurses and some local doctors communicated with the patients in Shona which is their first language. However, when consulting some specialist doctors, English language was used. Although there was a nurse to interpret what the doctor says to the patient, this might also be also a problem as the nurse may not explain clearly and in detail what was said by the doctor.

5.4 Implications of the findings to public health

Adherence to treatment recommendations (medication, diet and exercise) among diabetic patients is a major problem because it involves behaviour and lifestyle modification and it is also related to an interplay of several factors. These factors include socio-demographic, socio-cultural, environmental, health service/health system and health provider, and disease and therapeutic related factors. Therefore, there is need for all health workers and the patients to work collaboratively in order to avoid preventable morbidity, disability and premature deaths among diabetic patients.

5.5 Limitations to the study

The findings of this study were subjected to a number of limitations including the following:

Recall bias

The results of this study were affected by recall bias as both cases (non-adherers) and controls (adherers) were requested to report on past events. For example, data on medication adherence, nutritional intake and physical activity were obtained from self-reports which may be prone to recall bias.

Misclassification bias

Self-report measures of behaviour may have overestimated adherence or underestimated non-adherence to treatment recommendations. For instance, in this study adherence and non adherence to treatment recommendations were measured through self-reports on whether the patients missed doses or resupply dates and as such some patients might have lied about their adherence resulting in them being

classified as adherers. The desire to present oneself in a more favourable light and preserve self-esteem may have led to false classification of the participants.

Selection bias

In recruiting the study participants, the researchers excluded patients diagnosed with diabetes and were on treatment for less than one year. Therefore, these findings cannot be generalized to the whole the diabetic patients.

Observer/Interviewer bias

Observer/ Interviewer bias might have influenced the responses given by participants.

Co-morbidities- As the study included patients with co-existing illnesses, some of the results may not be purely indicative of the diabetic patients.

5.6 Conclusion

This study found out that the prevalence of non-adherence was high on diet (43.3%), followed by medication (38.9%) and lastly exercise (26%). The findings of this study also indicated that respondents from both groups (adherers and non-adherers) know and understand that taking medications, diet or exercise as recommended may improve their health. However, the majority of the non-adherers have not yet translated this into behaviour. Documentary review of patients' medical records revealed that despite the use of multiple anti-diabetic medications, only 17.4% of the non-adherers managed to achieve HbA_1c between 6.5%- 8.0%, 66.2% had their HbA_1c ranging from 8.5% to 33%. However, those patients who were adherent to

their treatment recommendations (medication, diet, exercise) were more likely to achieve glycaemic control.

The overall reasons which were found to negatively affect adherence to medication, diet and exercise found in this study were financial constraints, travelling away from home to attend social gatherings or official trips, shortage of food, lack of detailed information on how to exercise distance of home from health care facility, affordability and availability of some of the drugs. Patients who could only afford some of the drugs especially insulin and anti-hypertensive medication were at a higher risk of non-adherence due to failure to buy drugs from private pharmacies if they did not get them at the hospital. In addition, patients with co-morbidities such as hypertension, asthma, ulcers, TB and HIV were more likely not to adhere to treatment recommendations due to financial constraints and side effects as a result of the effects of some anti-diabetic, HIV and asthmatic regimens. Shorter duration on diabetes treatment was shown to be linked with non-adherence to diet and medication recommendations whereas longer duration was associated with adherence to exercise and diet.

Facilitators of adherence found in this study included social support, self efficacy, perceived benefits of medication and the desire to stay alive. The present study also highlighted the importance of social support particularly from members of the entire family in enhancing adherence to treatment recommendations and being a member of the diabetic association. Diabetes is most common among the elderly who are no longer working, physically weak and need the assistance of care givers to monitor their drug administration and even to help them follow the recommended diets. This study demonstrated that those patients who constantly received support especially

financial, emotional and moral support from either their spouses or children were more adherent to treatment recommendations than those who had no support. Health education was also found to be an important tool in improving patient adherence to treatment recommendations.

5.7 Recommendations

5.7.1 Provincial level: Ministry of health

Immediate recommendations

- Need for intensive educational campaigns in order to increase awareness of diabetes especially in rural areas in order to sensitize people on diabetes and its related complications to avoid situations where patients present late at health care facilities for example, the majority of diabetic presented at a health care facility after they have developed serious complications such diabetic foot, stroke, high blood pressure blindness, renal failure or heart failure.
- Resource mobilization- Need to mobilize for funds to buy critical resources required in the management and control of diabetes for instance, glucometers, testing sticks, syringes and drugs particularly insulin which is usually in short supply at Mutare Provincial Hospital
- Need to equip rural clinics with glucometers and anti-diabetic drugs.
- Consider transport vouchers to patients who cannot afford the cost of transport to collect their medication.
- Need to widen the network of health care facilities that provide diabetes medication through decentralizing the stocking and dispensing of diabetes medication to peripheral sites.

5.7.2 Institutional level: Mutare Provincial hospital

Immediate recommendations

- Doctors should be always available especially during diabetic clinics to attend to diabetic patients in time and to avoid long waiting time.
- Pharmacists to ensure constant supply of drugs especially insulin and anti-hypertensive drugs so as enhance medication adherence.
- To develop a systematic mechanism/ strategy to determine prevalence of adherence and non-adherence to treatment among diabetic patients.
- Need to create space for diabetic clinic in order to avoid congestion.
- Need for intensified training of diabetic patients in self-management to reduce the existing barriers to treatment recommendations.
- There is need to have a follow up program after patients are discharged from hospital.
- Health care providers should continue to provide health education to patients on the benefits of adhering to treatment recommendations.
- World events such as the World Diabetes Day could be used as a forum to highlight issues about diabetes, risk factors, complications and treatment.
- Patients suffering from complications due to non-adherence could be requested to share their experiences with other patients especially during health education sessions.

Medium- Long term recommendations

- Train more health care workers in diabetes care and management.

- Recruit more doctors/specialists specifically for diabetic patients in order to reduce patient waiting time.
- Need to mobilize for resources such as glucometers, testing sticks, syringes, drugs such as insulin to avoid situations whereby patients forced to buy from private pharmacies which are expensive. Also availing the drugs would reduce costs from the patients, increase adherence and reduce incidences of premature deaths due lack of insulin.
- Provision of Diabetes Self Management Education- Train patients on how to properly use glucometers to enhance their skills in self-monitoring of blood sugar. Proper training on how to use insulin injections is also required for patients who use insulin dependent regimens.
- Health care providers should take an active role in educating patients about the disease and medications

5.7.3 Individual level: Diabetes Patients

Due to the fact that diabetes mellitus is one of the most psychologically and behaviourally demanding of all the chronic disease and its management wholly depends on the patient, the researcher therefore recommends the following:

Immediate recommendations

- Improve health seeking behaviour to avoid serious long term complications associated with diabetes (for example, diabetic foot, amputations, blindness, death, disability related to stroke).

- Need to practice self-monitoring of blood glucose in order to develop skills which enhance optimal control of glucose.

Medium-Long term recommendations

- Need for lifestyle behaviour modification in order to improve adherence to treatment recommendations (sticking to the recommended meal plans, prescribed medications as well as exercising regularly).
- Need to have glucometers for testing of blood sugar at home to avoid taking medications blindly.

Overall, improving adherence requires a collaborative approach of the patient, the community, Ministry of health and health care workers.

5.8 Further research

- Further studies are recommended to confirm the findings of this study in order to help health care workers to develop appropriate interventions.
- Further research is also required to study the impact of adverse drug effects on medication adherence.

5.9 Dissemination of results

A copy of findings of the study was submitted to the Provincial Medical Director of Manicaland province. Another copy was submitted to Mutare provincial hospital and finally another copy was submitted to the Africa University Faculty of Health Sciences.

REFERENCES

1. Ali, S.M (2009) *Barriers to Optimal Control of type 2 diabetes in Malaysian Malay patients*, Global Journal of Health science, Vol1, No.2, http://www.ccsenet.org/gjhs accessed on 12/12/2011.

2. Aljasem, L. (2001) The impact of barriers and self efficacy on self-care behaviours in type 2 diabetes:

   http://www.ncbi.nlm.nih.gov/pubmed/11912800 accessed on 16/02/2012.

3. Ary, D.V (1986) *Patient perspective on factors contributing to non-adherence to diabetes care*, March to April 1986; 168-72

4. Azevedo, M. and Alla, S (2008) Diabetes in Sub-Saharan Africa: Kenya, Mali, Mozambique, Nigeria, South Africa and Zambia; International Journal of diabetes in Developing countries, 2008; 28: 101-108.

5. Biriwesha, K.M (2009) *Diabetes in Zimbabwe,* Available at: http://www.thenewafricatimes.com/apps/forums/topics/show/1595590-diabetesinZimbabwe accessed on 17/12/2011.

6. Bisiriyu, A.G (2007) *Non-adherence to lifestyle modifications (Diet and exercise) amongst type 2 diabetes mellitus patients attending extension II Clinics in Gaborone*, Botswana http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2584325/accessedon 07/11/2011.

7. Boyle J.P (2001) *Projection of diabetes burden through 2050: impact of changing demography and disease prevalence in the U.S*: *Journal of Diabetes Care, 2001; 24: 1936-1940.*

8. Broadbent, E (2011) *Illness and treatment perceptions associated with adherence to medications, diet and exercise:* Journal for Diabetic care February 2011, Vol34, No.2, 338-340 http://care.diabetesjournals.org/content/34/2/338.full,accessedon 08/02/2012.

9. Caballero, A.E (2004) *Psychosocial factors associated with diabetes self-care*, Available at: http://www.elsevier.com

10. Cassar, K. A (2003) *Health beliefs and treatment adherence among Maltese and Anglo-Saxon Australians with type 2 diabetes mellitus*: Available at: http://www.vuir.vu.edu.au/15745/ accessed on 22/01/2012.

11. Centre for Chronic Disease Prevention and Health Promotion National (2007) *Diabetes Fact Sheet* , Available at: http://www.cdc.gov/diabetes/pubs/factsheet07.htm accessed 12/12/2011.

12. Chua, S.S and Chan, S.P (2011) *Medication adherence and achievement of glycaemic targets in ambulatory type 2 diabetic patient*s; Journal of Applied pharmaceutical science 01 (04): 2011:55-59 Available on line at: www.japsonline.com Accessed on 31/01/2011.

13. Ciechanowski, P.S et al (2004) *Influence of patient attachment style on self-care and outcomes in diabetes,* Journal for Psychosomatic medicine accessed on 03/03/2012.

14. Ciechanowski, P.S et al (2000) *Depression and diabetes*, Journal for International Medicine, Vol.160, No.21, 2000; Available at: http://archinte.ama.assn.org/cgi/content/abstract/160/21/3278. accessed on 16/01/2012.

15. Ciechanowski, PS, et al (2001) *The patient-provider relationship: Attachment theory and adherence to treatment in diabetes:* Available at: *16.* http://www.ncbi.nlm.nih.gov/pubmed/11136630 accessed on 20/01/12

16. Ciherman, A (2011) *How adherent people more likely to think? A meta-analysis of health beliefs and diabetes self-care*, Available at: http://www.ncbi.nlm.nih.gov/pubmed/21478378 accessed on 16/02/2012.

17. Cramer, J.A (2007) *A systematic review of adherence with medications for diabetes* http://www.ncbi.nlm.nih.gov/pubmed/15111553 accessed on 16/03/2012.

18. Daly, J.M et al (2009) An Assessment of attitudes, behaviours and outcomes of patients with type 2 diabetes, Available at: http://www.ncbi.nlm.nih.gov/pubmed/19429734 accessed on 16/02/2012.

19. Dodge E (2010) *Ten steps to Exceptional health*, American College of lifestyle medicine, Charleston, USA.

20. Dev, J et al (2001) *Factors influencing patient acceptability of diabetes treatment regimens* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2584325/ accessed on 12/01 2012.

21. Dezii, C.M et al (2002) *Effects of once-daily and twice-daily dosing on adherence with prescribed Glipizide oral Therapy for type 2 diabetes*: http://www.medscape.com/viewarticle/426957_1accessed on 21/02/2012.

22. Farmer, A. (2005) *Measuring beliefs about taking hypoglycaemic medication among people with type 2 diabetes,* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2584325/ accessed on 07/11/2011.

23. Fisher, W.A (2007) *Barriers and behaviours in blood glucose monitoring*, Available at: http accessed on 22/01/2012

24. Fitzgerald, J. T., Anderson, R.M and Davis, W. (1995): *Gender differences in diabetes attitudes and adherence; The Diabetes Educator, 1995; 21: 523-*

528 http://site.ebray.com.ezproxy.liv.ac.uk/lib/liverpool/Doc?id=10076713 Accessed on 16/11/2011.

25. Glasgow, R.E et al (1997) *Personal-model beliefs and social-environmental barriers related to diabetes self-management*, Available at: http://www.ncbi.nlm.nih.gov/pubmed/9096980 accessed on 16/02/2012.

26. Goering, E.M and Matthias, M.S (2010) *Coping with chronic illness: Information use and treatment adherence among people with diabetes:* Available at:http://www.ncbi.nlm.nih.gov/pubmed/22049634 accessed on 18/02/2012.

27. Gonzalez, J.S et al (2008) *Depression and diabetes treatment non-adherence: A meta- analysis http://www.ncbi.nlm.nih.gov/pubmed/19033420 accessed on 18/02/2012*.

28. Golin, C.E et al (1996) *The role of participation in the doctor visit: Implications for adherence to diabetes care,* Diabetes care, Volume19, No.10 October 1996,Available at: http://care.diabetsjournals.org/content/19/10/1153.full.pdf+html accessed on 18/02/2012.

29. Grant, R et al (2007) *Relationship between patient medication adherence and subsequent clinical inertia in type 2 diabetes glycaemic managemen*t, Journal for Diabetes care http://www.ncbi.nlm.nih.gov/pubmed/17259469 accessed 16/03/2012.

30. Guthrie, D.A and Guthrie, R. A (1991) *Nursing management of diabetes mellitus*, Springer Publishing Company, New York.

31. Harvey, J.N and Lawson, V.L (2008) *The importance of health belief model in determining self-care behaviour in diabetes*;

http:faculty.ksu.edu.59/14798/Articles 382/Harvey, Health cognitions-diabetes, Diabetic Med,2008.pdf accessed on 08/02/2012.

32. Hashmi,S.K et al (2006) *Factors associated with adherence to antihypertensive treatment in Pakistan*, Available at:
http://www.plosone.org/article/info:doi/10.1371/journal.pone.0000280
Accessed on 16/02/2012

33. Heisler, M et al (2010) *Study Protocol: The adherence and intensification of medications (AIM) study-A cluster randomized controlled effective study:* Available on line at: http://www.trialsjournal.com/content accessed on 12/12/2011.

34. Hjelm, K and Mufunda, E (2010) *Zimbabwean diabetics' beliefs about health and illness: An Interview Study* http://www.biomedcentral.com/1472-698X/10/7 accessed on 16/12/2012.

35. Jackson, C.A (2010) *Factors associated with non-adherence to Oral medication for inflammatory bowel disease*: Available at: http://www.ncbi.nlm.nih.gov/pubmed/19997092 accessed on 20/3/2012.

36. Jannice, C et al (2010) *External barriers to diabetes care: Addressing persona land health system issues: Diabetes Spectrum,* January 2001, Volume 14, No 123-28 http://spectrum.diabetesjournals.org/content/14/1/23.full.

37. Jeffrey, S et al (2008) *Depression and diabetes treatment non-adherence: A Meta-Analysis* http://www.fafp.org/pdf/41.pdf Accessed on 01/02/2012.

38. Kalyango, J.N, Owino, E. and Nambuya, A.P (2008) *Non-adherence to diabetes treatment at Mulago hospital in Uganda: Prevalence and associated factors*: Available at: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2584325/ accessed on 19/12/2011.

39. Karter, A.J, et al (2000*) Self-monitoring of blood glucose: Language and financial barriers in a managed care population with diabetes. Diabetes Care 23:*477*–483, 2000* http://care.diabetesjournals.org/content/23/4/477 accessed on 23/02/2012.

40. Khattab, M, Khader, Y.S Ai-Khawaldeh, A and Ajlouni, K (2008) *Factors associated with poor glycaemic control among patients with type 2 diabetes,* Journal of diabetes and its complications : Available at: *http://www.ncbi.nlm.nih.gov/pubmed/15707440* accessed on 16/02/2012.

41. Kenreighn, C.A (2005) *Medication adherence: A literature Review: Type 2 diabetes* http://www.medscape.com/viewarticle/514163 accessed on 22/02/2012.

42. Kirigia, J.M et al (2009) *Economic burden of diabetes mellitus in WHO African region*, http://www.biochemical.com1472-698X/9/6 accessed on 16/01/2012.

43. Kumar, P.N and Halesh, L.H (2010) *Antihypertensive treatment: A study on correlates of non adherence in a tertiary care facility*, International Journal of Biological & Medical Research: Available at: www.biomedscidirect.com , accessed on 19/02/2012.

44. Lam, P.W et al (2007) *Drug non-adherence and associated risk factors among Chinese geriatric patients in Hong Kong*, Hong Kong Med Journal, Volume 13, No.4, August 2007, http://www.hkmj.org accessed on 13/02/2012.

45. Lee, R. and Taira, D.A (2005) *Adherence to oral hypoglycemic agents in Hawaii*, Available at: http://www.ncbi.nlm.nih.gov/pubmed/15888220 accessed on 02/03/2012.

46. Littlefield et al (1991) *Relationship of self-efficacy and binging to adherence to diabetes regimen among adolescents*; Available at: http://care.diabetesjournals/content/15/1/90.short accessed on 02/03/2012.

47. International Diabetes Federation (IDF*) Diabetes Atlas (2006), Type 2 Diabetes Mellitus*: http://www.eatlas.idf.org/Types-of-diabetes Accessed on 17/11/2011.

48. McKellar, J.D, Humpreys, K and Piette, J.D(2004) *Depression increases diabetes symptoms by complicating patients' self-care adherence,* The Diabetes Educator, Volume 30, Number 3, May/June.

49. Maphosa, D. Mudimu, E. Sigauke, C. Mlilo, P.Nyamugure, P. and Dube S. (2011) *Relating Glycaemia levels in Zimbabwean population to some established type 2 diabetes risk factors using multiple linear regression*, http://scholarsresearchlibrary.com/archive.html Accessed on 16/12/2012.

50. Mawji, K.G (1991) *Diabetes under control: A Self-Management Guide*, Zimbabwe Publishing house, Harare.

51. Miccoli, R (2011) *Multidrug treatment of type 2 diabetes: A challenge of compliance* : Available at: http://www.ncbi.nlm.nih.gov/pubmed/21525461accessedon 28/02/2012.

52. MOH and WHO (2010) *Technical Guidelines for Integrated Disease Surveillance and response for Zimbabwe;* 280-281, World Health Organization, Harare.

53. Morisky, D (2005) *Methods to improve medication adherence in patients with hypertension: Current status and future directions*: http://journals.www.com/cocardiology/Abstract/2005/07000/methods_to_improve_medication_adherence.aspx accessed on 10/02/2012.

54. Mufunda, J et al (2006) *Prevalence of Non-communicable diseases in Zimbabwe: Results from analysis of data from the National Central Registry and urban survey*, http://www.ncbi.nlm.nih.gov/pubmed/16937610 accessed on 11/01/2012.

55. Mufundikawa, A. (2007) *The prevalence of diabetic nephropathy in adults with insulin dependent diabetes attending Parirenyatwa Diabetic clinic Harare*; Available at: http://www.ncbi.nlm.nih.gov/pubmed/20353128 accessed on 11/02/2012.

56. Murray, M.D et a l (2004) *A conceptual framework to study medication adherence in older adults:* http://www.humanfactors.illinois.edu/ReportsandPapersPDFs/murmorweiciatudeebrawei04.pdf The American Journal of Geriatric pharmacotherapy, March 2004, Volume 2, No.1.

57. MOHCZ and WHO (2011) Edliz: *Essential medicines list and standard treatment guidelines for Zimbabwe,* WHO.

58. Nyambura, A. (2009) *Factors that influence non-adherence to antiretroviral therapy among HIV and AIDS patients in Central Kenya Province* http://www2.aau.org/aur-hiv-aids/docs/students/nyambura_anthony.pdf accessed on 28/01/2012.

59. Osterberg, L and Blaschke, T. (2005) *Adherence to medication*: Journal of medicine NEngl J Med 2005; 353:487-497.

60. Otieno, C.F (2003) *Quality of glycaemic control in ambulatory diabetics at the outpatients clinic at Kenyatta National hospital*, Nairobi, East African Journal, 2003:80;406-10.

61. Patino, A.M et al (2004) *Health Beliefs and regimen adherence in minority in minority adolescents with type 1 diabetes* http://jpepsy.oxfordjournals.org/content/30/6/503.full accessed on 09/02/2012.

62. Pham, D. T et al (1996) *The role of Health Belief Model in amputees' self-care behaviours:* http://www.ncbi.nlm.nih.gov/pubmed/8697962 accessed on 16/02/2012.

63. Phillips, K.A (1998) *Understanding the context of health care utilization: Assessing environmental and provider –related variables in the behavioural*

model of utilization: http://www.ncbi.nlm.nih.gov/pubmed/9685123 accessed on 17/12/2011.

64. Polly, R.K (1992) *Diabetes health beliefs, self-care behaviours and glycaemic control among older adults with non-insulin dependent diabetes mellitus* http://www.ncbi.nlm.nih.gov/pubmed/1628534 accessed on 16/02/2012.

65. Rheeder, P (2006) *Type 2 diabetes: The emerging epidemic*, South Africa Family Practice, 2006; 48:20

66. Roglic G and Unwin N (2010) *Mortality attributable to diabetes: Estimates for the year 2010.* Available at http://www.journalofdiabetology.org/Pages/Releases/FullTexts/SixthIssue/RA-1-JOD-11-007.aspx accessed on 07/01/2012.

67. Rowley, C (1999) *Factors influencing treatment adherence in diabetes*, http://www.who.int/features/facilities/diabetes/01en.htmlaccessedon 15/12/2011.

68. Sanal, T.S et al (2008) *Factors associated with poor control of type 2 diabetes mellitus: A systematic review and Meta-analysis*: Journal of Diabetology in Asia study group: Available at: http://scholarsresearchlibrary.com/archive.html Accessed on 16/12/2012.

69. Schimttdel, J.A et al (2008) *Why don't diabetes patients achieve recommended risk factor targets? Poor adherence versus lack of treatment intensification*; Journal for General International medicine.

70. Serour, M (2007) *Cultural factors and patients' adherence to lifestyle measures*; British Journal of General Practice, 2007; 57:291-293

71. Shaw, J.E et al (2010) *Global estimates for the prevalence of diabetes for 2010 and 2030. Diabetes,* Res Clinical Practice 2010; 87: 4-14, Available at: http://www.journalofdiabetology.org/Pages/Releases/FullTexts/SixthIssue/RA-1-JOD-11-007.aspx Accessed on 01/02/2012.

72. Siqurdardo'ttir, A.K (2005) Self-care in diabetes: Model of factors affecting self-care: http://www.ncbi.nlm.nih.gov/pubmed/15707440 accessed on 16/02/2012.

73. Sobngwi, E. et al (2007) *Diabetes in Africa*: http://www.uchsc.edu/misc/diabetes/IDEG/IDEG_DOCS/Sobngwi.pdf accessed on 28/11/2011.

74. Sokol, M.C, McGuigan, K.A, Robert, R and Robert, S(2005) *Impact of Medication adherence on hospitalization risk and healthcare cos*t, Medical care. Volume 43, Number 6, June 2005

75. Stretcher, V.J and Rosenstock, I.M (2001) *Health behaviour and health education: Theory, Research and Practice*, Jossey-Bass Publishers, San Francisco.

76. Tang, S.T et al (2008) Social support, quality of life and self-care behaviours among African Americans with type 2 diabetes; Available at: http://tde.sagepub.com/content/34/2/266.short accessed on 28/02/2012.

77. Tiv, M et al (2007) *Medication adherence in type 2 diabetes: The Entered Study, A French Population Based*: http://www.ncbi.nlm.nih.gov/pubmed/22403654 accessed on 20/03/2012.

78. Travaline, J.M et al (2005) *Patient-physician communication: Why and How?* http://www.jaoa.org/content/105/1/13.full.pdf+html accessed 23/02/2012.

79. Turchin, A. (2008) *Poor outcomes in diabetes care: Is medication non-adherence or lack of treatment intensification to blame*? http://www.nature.com/nrendo/journal/v4/n10/full/ncpendmet0926.html accessed on 14/12/2011.

80. Uchenna, O et al (2010) *Contributory factors to diabetes dietary regimen non-adherence in adults with diabetes,* Available at: http:www.waset.org/journals/waste/v69/v69-136.pdf accessed on 01/02/2012.

81. Vincze, G et al (2004) *Factors associated with adherence to self-monitoring of blood glucose among persons with diabetes,* Available at: http://www.ncbi.nlm.nih.gov/pubmed/14999899 accessed 20/01/2012

82. Wabe, T.N (2011)*Medication adherence in diabetes mellitus and self-management practices among type 2 diabetics in Ethiopia*; Journal for Medical Sciences 2011 September, Volume 3. No.9 http://www.najms.org/old/resources/pdf. Accessed on 01/02/2012.

83. Wens, J et al (2005) *GP's perspectives of type 2 diabetes patients' adherence to treatment: A quantitative analysis of barriers and solutions*

84. Wild, S et al (2004) *Global prevalence of diabetes: Estimates for the year 2000 and projections for 2030*; Journal of Diabetes Care, 2004; 27:1047-53.

85. WHO (2003) *Adherence to long-term therapies: Evidence for action*, http://apps.who.int/medicinedocs/en/d/Js4883e/8.4.5.htmLaccessed on22/01/2011

86. WHO Africa (2007) *The Burden of Chronic Diseases in the African Region, Preventing Chronic Diseases a Vital Investment*. In: World Diabetes Foundation Summit. Available from: http://www.who.int/chp/chronic%20disease%20report/en/ Accessed on 22/11/2011.

87. WHO (2007)*The Impact of Chronic Disease in Africa*: Available at:

http://www.who.int/whosis/data/webcite accessed 12/12/2011.

88. World Health Organization (2008) *WHO diabetes programmes*,

http://www.who.int/mediacentre/factsheets/fs312/en/ accessed on 12/12/2011.

89. Wong, M.C et al (2010) Adherence to oral hypoglycemic agents in 26.782 Chinese patients: Available at: http://www.ncbi.nlm.nih.gov/pubmed/21098691 accessed on 17/02/2012.

90. Zgibor JC, Simmons D (2002) *Barriers to blood glucose monitoring in a multiethnic community,* Available at*:* http://www.ncbi.nlm.nih.gov/pubmed/12351476 accessed on 20/01/12.

91. Ziemer, D.C et al (2006) *Clinical inertia contributes to poor diabetes control in primary care setting* http://tde.sagepub.com/content/31/4/564.abstract accessed on 18/02/2012.

92. Zimnet, P et al (2001) *Global and societal implications of diabetes epidemic*; Nature, 2001; 414:782-7

to improve the areas that may be lacking and policy makers to develop policies and strategies which may help to solve the problems you might be facing. Information you provide may also be used to design effective interventional programs.

ANONYMITY

No name will be used in connection with any information that you provide.

CONFIDENTIALITY

The records of the study will be kept private. In any type of report the researcher might publish, no information that will be possible to identify a participant shall be included. Research records will be kept in a locked file. Access to the records will be limited to the researcher and authorized Ministry of health, Africa University and the Medical Research Council of Zimbabwe personnel.

VOLUNTARY NATURE OF STUDY

Participation in this study is voluntary. If you choose not to participate, it will not affect the level of treatment and care you are receiving (for case still under hospital management). There is no penalty for refusing to participate.

RISKS

No physical or psychological harm is associated with this study.

STATEMENT OF CONSENT

By signing this form, I agree that:

I have been taught the purpose and objectives of this study and read about what this research is all about. I had the opportunity to ask questions and received satisfactory answers. I understand that I am being asked and not forced to participate in this

study. I understand the risks and benefits and I freely give my consent to participate in this research project. I have been given a signed copy of this informed consent, which I am supposed to keep.

Signature of participant…… Date……..

Signature of witness……Date……

Investigator's Statement

I have carefully explained the purpose of this study, benefits, demands, voluntary nature of participation, risks involved in participating in this study. I hereby certify that the participant clearly understands what this study is all about and what it involves.

Signature of researcher……Date……

Questions and Contacts

If you have any questions regarding this study, please contact the following:

1. The Medical Research Council of Zimbabwe: Telephone 791792/791193/792747

   E-mail: mrcz@mrczimsahred.co.zw / mrcz@mrczimshared.co.zw

2. Dr O. Fasan, Africa University, Dean of Faculty of Health Sciences:

   Telephone: 60026/60075: E-mail: deanhealthsciences@africau.ac.zw.

3. Professor E. Chideme-Munodawafa: Assistant Dean Faculty of Health Sciences. Telephone:(+263-20)60075/26 Ext.462, Cell:(+263772 136 880)

   Email: munodawafa1@gmail.com / chidemee@africau.ac.zw .

APPENDIX II: ENGLISH QUESTIONNAIRE

Questionnaire No ▢▢▢ Health Centre.....

Topic: Non-adherence to treatment recommendations among diabetic patients attending Out Patients clinic at Mutare Provincial hospital in Manicaland province, February - April 2012.

SECTION A DEMOGRAPHIC DATA

1. Sex/ Gender of participant (1) Male [ ] (2) Female [ ]

2. Age _____

3. What is your current marital status? 1). Single (not married and not living with a partner) [ ]

2) Married (monogamous/polygamous) [ ] 3). Separated (currently not living together but not divorced) [ ] 4) Divorced [ ] 5) Widowed/ widower [ ] 6) Co-habiting (not married but lives with a partner) [ ]

4. Number of in the family …….

5. What is your highest level of education?

1) None [ ] 2) Primary [ ] 3) Secondary [ ] 4) University/college education [ ] 5) Adult education [ ]

6. What is/was your main occupation? 1) Student [ ] 2) Employed full time [ ]

3) Employed part time [ ] 4) Business/self employed. [ ] 5) Sick leave [ ] 6) Unemployed [ ] 7) Others (specify)……..

7. Place of residence: 1.Rural area 2. High density suburb 3. Low density suburb 4. Peri-urban

5. Farm 6. Mine 7 Other(specify).....

8. Religious affiliation: 1. Traditional African 2. Apostolic 3. Orthodox 4.None 5. Other(specify.....

9. What is your average monthly income (USD): **1.** <100 **2.**100-200

3. 200-500 4. >500

10. Other sources of income (specify)……..

SECTION B: KNOWLEDGE ABOUT DIABETES MELLITUS

11a) Do you know the causes of diabetes? 1. Yes[ ] 2. No [ ]

b) If ''Yes'' above, list two causes (i)_____ (ii)_____

12. What are the signs and symptoms for low blood sugar or high blood sugar?

(Give a point if the respondent mentions any one of the following) 1. Shivering 2. Sweating 3. Headache 4.Dizziness 5. Feeling thirsty 6. Always feeling hungry 7. Frequent urination 8. Weight loss

13. What are the complications associated with diabetes mellitus? 1. Death 2. Heart disease 3. Kidney disease 5. Amputations 6. Impotence 7.Memory loss

8. Other specify_____

SECTION C: ADHERENCE TO MEDICATION /DRUGS, DIET AND EXERCISES

14. Treatment modality

a) Diet 1.Yes [ ] 2.No [ ]

b) Tablets 1. Yes [ ] 2. No [ ]

c) Insulin/injection 1.Yes [ ] 2. [ ]

d) Both tablets and insulin 1. Yes [ ] 2. [ ]

For those on oral anti-diabetic agents/insulin

15. Which drugs are you currently taking?(Counter check the patient's medical record)

Drug	Yes	No
1.Metformin		
2.Acarbose		
3.Atrapid		
4.Glibenclamide		
5.Glipizide		
6. Insulin(e.g protaphane)		
7. Other_____		

16. How many times do take the drugs per day? 1. Once 2. Twice 3. Thrice 4. Four times

17. Have you forgotten to take your medicine in the past month?

1. Yes [ ] 2.No [ ]

18. Do you sometimes stop taking medicine when you feel better?

1. Yes [ ] 2.No [ ]

19. Do you sometimes stop taking medicine if you feel worse when you take it?

1. Yes [ ] 2. No [ ]

20 a) Do you adhere to any form of diabetic diet recommendations?

1. Yes [ ] 2. No [ ] (*If "No" proceed to question 21*)

b) If 'Yes' what kind of healthy diet recommendations are you adhering to (You may tick more than one option)

1. High starch and fibre diets [ ] 2. Low saturated fat and caloric intake [ ]
3. Fruits & vegetables [ ]
4. Regulated alcohol intake and smoking cessation [ ]
5. Eat more of sugar, Carbohydrate and fat meals [ ]
6. Eat any kinds of food [ ]
6. Other_____

c) Do have any difficulties in changing dietary habits? 1. Yes [ ] 2. No [ ]

d) Do you often eat later or skip meals? (1 never- 5 always)

e) Do you eat food which you should avoid? (1never-5 always)

21. a) Has your doctor or nurse advised you to exercise? 1. Yes [ ] 2. No [ ]

b) If YES, what kind of gentle aerobic exercise recommendations are you adhering to?

1. Brisk walking [ ] 2. Cycling [ ] 3. Jogging [ ] Sport activities [ ]

Other_____

22a. If ''Yes,'' how long per day do you perform the exercises 1. 10-15 minutes 2. 20-30 minutes 3. >45minutes

22b. Do you have any difficulties in changing physical activities?

1. Yes [ ] 2. No [ ]

SECTION D: SOCIO-CULTURAL FACTORS (perceptions/attitude, beliefs)

23a) What is your opinion concerning diabetic treatment recommendations?

1.Strongly disapprove [ ] 2.Disapprove [ ] 3.Undecided [ ] 4.Approve [ ]

5.Strongly approve [ ]

23b) Are there any benefits of adhering to prescribed drugs, diet or exercises?

1. Yes [ ] 2. No [ ]

23c) If ' Yes,'' may you please explain_____

24a). Does your religion hinder you from adhering to treatment recommendations?

1. Yes [ ] No [ ]

b). Does your culture bar you from adhering to treatment recommendations?

1. Yes [ ] 2. No [ ]

c). Have you ever consulted an apostolic faith healer for treatment?

1. Yes [ ] No [ ]

d). Have you ever consulted a traditional healer for treatment?

1. Yes [ ] 2. No [ ]

e). Have you ever used herbs for treatment of diabetes of your condition?

1. Yes [ ] 2. No [ ]

Self –efficacy

25a) How confident are you in your ability to follow your diabetes treatment plan?

1. Not at all [ ] 2. A little [ ] 3. Somewhat [ ] 4.Very confident

b)How confident are you in your ability to eat meals at regularly controlled times, every 4-5 hours, follow the diabetic meal plan and to select healthy foods?

1.Not at all [ ] 2. A little [ ] 3. Somewhat [ ] 4.Vey confident [ ]

c) How confident are you in your ability to exercise regularly, 3 times weekly for 30-45 minutes? 1. Not at all [ ] 2.A little [ ] 3.Somewhat [ ] 4.Very confident [ ]

Perceived barriers to adherence (Non-adherers)

Non adherence to medicine/therapy recommendations

26a) What is preventing you from adhering medication recommendations? **Please tick all that apply. You may tick more than one option.**

1. When I am too busy [ ] 2. Weather (especially when it's hot or too cold) [ ] 3. Lacking spousal supervision in drug administration [ ] 4. Travelling away from home (e.g. Attending funerals, meetings, herding cattle/working in the fields trips [ ] 4. Presence of other make me feel uncomfortable [ ] 5. Taking too much drugs per day/Too much pill burden [ ] 6.Injecting oneself [ ] 7. Side-effects [ ]

8. Granting self permission [ ] 9 .When I am feeling very ill [ ]

26b). Is diabetic diet affordable? 1. Yes [ ] 2. No [ ]

Non adherence to dietary recommendations

26c) Please indicate reason (s) for non-adherence to

Dietary habits/prescriptions from the list given below

1. Eating out (restaurant, ceremonies, work, family & friends' homes) [ ]

2. Inappropriate dietary habits (e.g. eating snacks in-between meals) [ ]

3. Financial constraints (to procure ideal healthy diets) [ ]

4. Poor self efficacy [ ]

Non-adherence to exercise recommendations

26d) Do you think exercise worsens the illness? 1. Yes [ ] 2.No [ ]

26e) What prevents you from following the recommended exercises? 1. Physical Weaknesses [ ] 2. Body pain [ ] 3. Sickness [ ] 4. Ageing [ ] 5.Other specify_____

SECTION E: Disease and treatment related factors

27 Do you suffer from other diseases other than diabetes 1. Yes [ ] No [ ]

b). If **' Yes,''** which diseases?_____

28. Which other drugs (besides anti-diabetic drugs) are you currently taking ? 1. Pain killers 2. Appetitive stimulants /vitamins 3.sleeping tablets 4.HIV treatment (ART) 5. TB treatment 6. BP treatment 7. Fungal treatment

Other (specify).....

SECTION F: Social support

29. Where do you get support from?1. Spouse [ ] 2. Children [ ]

3. Relatives [ ] 4. Friends [ ] 5. Other specify_____

30. What type of support do you get? 1. Financial support [ ] 2. Material support(food or clothing) [ ] 3. Emotional support [ ]

4.Other(specify)_____

31. Do you consistently receive moral and/or emotional supports from your family members towards adhering to lifestyle modification and treatment recommendations?

1.Yes [ ] 2. No [ ]

32. Do you consistently receive friends' support towards adhering to treatment recommendations?

1. Yes [ ] 2. No [ ]

32b. Are you a member of the diabetic association? 1. Yes [ ] 2 [ ]

SECTION G: HEALTH SERVICE FACTORS

Health care workers' attitude

33. Approximately how long does it take for you to be served when you come to the health centre? 1. A few minutes 2. About 1 hour [ ] 3. 1-2 hours [ ] 4. 2-4 hours [ ] 5. > 4 hours [ ]

34. How do you rate the attitude of the health workers who serve you? 1 to 5 (*1- Unacceptable; 5- Excellent*)

1 2 3 4 5

Patient-provider relationship

35. Do you often communicate with the doctor using your first language?

1. Yes 2.No

36. Time since last seen by a doctor or a nurse 1. ≤ 3months 2. > 3 months3. I don't know.

Cost of health services

37a) Do you pay for services offered at this health centre every time you visit?

1. Yes [ ] 2. No [ ]

If yes, how much do you pay? USD _____

37 b) Is it easy for you to pay this amount? 1. Yes [ ] 2 No [ ]

Accessibility

38. Where do you get your anti-diabetic drugs from? (*Tick all appropriate*)

1. Mutare Provincial Hospital [ ] 2. Private pharmacy [ ] 3. Informal market [ ] 4. Local Clinic pharmacy [ ]

39a) How far is your home from this health care facility? 1. Below 15km [ ]

2.16-30km [ ] 3. 31-60km [ ] 4. 61-100km [ ] 5. Above 100km [ ]

b) How much do pay for transport to come for resupply and check-ups? 1. $1-2 2. $ 3-5 3. $6-10 4.Above 10*Health education*

40. Have you ever received health education or detailed written instruction regarding exercise programs from any health care provider?

1. Yes [ ] 2. No [ ]

41. Have you ever received detailed written instruction regarding healthy dietary habits from any health care provider?

1. Yes [ ] 2.No [ ]

42. Have you ever received detailed instructions about how you should take your medicines? 1. Yes [ ] 2. No [ ]

43. Did you receive health education in the past six months? 1. None [ ]

2. Once [ ] 3.Twice [ ] 4.More than twice [ ]

THANK YOU VERY MUCH FOR YOUR TIME

APPENDIX III : GWARO REMVUMO

MUSORO WETSVAGURUDZO: KUSATEVEDZWA KWEZVINOFANIRA KUITWA NEVANE CHIRWERE CHESHUGA VANOONEKWA PACHIPATARA CHEMUTARE PROVINCIAL HOSPITAL, KUBVA MUNA KUKADZI-KUBVUMBI 2012

MUTSVAGURUDZI

Zita rangu ndiWinnie Mandewo. Ndiri mudzidzi we Masters in Public Health pa Africa University. Ndiri kuitawo tsvagurudzo yangu pamusoro pezviri kukanganisa vamwe vanhu vane chirwere cheshuga kutevedzera izvo zvose zvinodikanwa kuti vaite mukuedza kurapa chirwere ichi(*kutora mishonga nomazvo uye nenguva, Kudya zvokudya zvinokurudzirwa uye kuita maekisesaizi).* Muri kukumbirwa kuti mundibatsirewo nokupindura mibvunzo iri maererano netsvagurudzo iyi. Verengai gwaro rino kana mune mibvunzo makasununguka kubvunza musati matanga kupindura.

MUBHADHARO

Hapana mari kana mubhadharo uchazopiwa avo vanenge vabvuma kupinda tsvagurudzo ino.

ZVAKAVANZIKA

Hapana zita kana mazita achaburitswa mutsvagurudzo iyi. Ruzivo ruchawanikwa rwuchanyorwa nenzira isingabudisi mazita evanhu, kana zvimwe zvingaita kuti vamwewo vanhu vafungidzire vanhu vari kunyorwa nezvavo.

KUCHENGETEDZEKA KWEZVAKAVANDIKA (Confidentiality)

Musati mandipa mvumo yenyu nekusaina pagwaro rino makafanira kuziva kuti ruzivo rwatichawana mutsvagurudzo ino ticharubuditsa kuvanhu kana mapato api.

Ruzivo rwandichawana kubva kwamuri ndicharugoverana nemumiriri mukuru wegurukota rezveutano muno muManicaland (Provincial Medical Director), nevanobata nezveutano vemaMutare, veBato(Faculty) rezvedzidzo yezveutano paAfrica University uye vakuru nevashandi vechipatara cheMutare Provincial hospital. Zvakakosha kuti ruzivo rufararire kwakawanda kuti zvigobatsira vanhu vakawanda vari kwese kwese vanodaro vachibatikana nenyaya dzakafanana nedzenyu.

SARUDZO YAKASUNUNGUKA

Hamumanikidzwe kubvuma kupinda muchirongwa chemhenenguro iyi. Zviri kwamuri. Kunge maramba, iyi sarudzo haizokanganisi marapirwo kana ukama pakati penyu nechikoro kana vashandi vepaAfrica University. Kuti mabvuma hamusungirwe kuramba muri muchirongwa kana musisadi panguva inozotevera

ZVEKUCHENJERERA

Hapana zvinotyisa kana zvakaipa zvinotarisirwa kuti zvingakuwirai zvichikonzerwa nekuti mapinda mumhengenuro iyi. Kana tichiti zvakaipa zvingawira munhu tinoreva zvinhu zvakadai sezvedzimhosva, zveutano, zvemari kana zvekushungurudzika mupfungwa.

KUBVUMA

Ndadziziswa zvose zviri maererano nechinangwa chetsvagurudzo iyi,ndawana mukana wokubvunza mibvunzo iri pamusoro petsvagurudzo iyi. Ndinobvuma

kupinda mutsvagurudzo iyi. Mutsvagurudzi avimbisa kuchengetedza zvose zvichabuda mutsvagurudzo ino zvakavanzika.

Sainecha yenyu……Zuva……..

Sainecha yemufakasi(Witness)……Zuva……...

Sainecha yemutsvagurudzi…….Zuva……

APPENDIX IV: MIBVUNZO MUCHISHONA

Nhamba ▢▢▢

Zita rangu ndiWinnie Mandewo. Ndiri mudzidzi weMasters in Public Health paAfrica University. Ndiri kuita tsvagurudzo yangu pamusoro pemamwiro emishonga yechirwere cheshuga, madyiro amunoita zvokudya zvamunobvumidzwa nemaitiro emunoita maekisesaizi uyewo zvinokukurudzira kana kukutadzisa kutevedzera kurudziro dzamunopiwa navarapi. Ndinokumbirawo kumbokubvunzai mibvunzo pamusoro pezvamunoziva kana kufunga nezvenyaya iyi. Zvamuchataura zvose zvichagara zvakavanzika uye zita renyu harizoburitswi muzvinyorwa zvose zvichaitwa maererano nezvichange zvabuda mutsvagurudzo ino Makasununguka kuregedza kuita nezve tsvagurudzo ino uye hamumanikidzwi kuramba muchitaura neni, kana mafunga kuregedza munoita sokuda kwenyu.

CHIKAMU CHOKUTANGA: RUZIVO PAMUSORO POMUNHU

1. Muri munhui? 1.Munhurume[ ] 2.Munhukadzi [ ]
2. Mune makore mangani okuberekwa?_____
3. Makaroora/roorwa here? 1. Ndakaroorwa [ ] 2.Ndiri ndega [ ]
   3.Takarambana [ ] 4. Chirikadzi/rume [ ] 5. Kugarisana/kuchaya mapoto[ ]
4. Munogara muri vangani mumba menyu?_____
5. Makadzidza kusvika murugwaro rwupi? 1. Handina [ ] 2. Puraimari [ ]
   3. Sekondari [ ] 4. Koreji/University [ ] 5.Chikoro chavakuru [ ]
6. Munoita basa rei? 1. Ndiri kudzidza [ ] 2. Ndinoshanda [ ]

3 Handishandi [ ] 4.Ndiri kuzviitira bhizimusi rangu [ ]

5.Ndiri pazororo rokurwara[ ] 6. Ndiri pamudyandigere [ ] 7.Zvimwewo(tsanangurai).....

7. Munogara kupi? 1 .Kumaruwa[ ] 2. Kumarokesheni[ ]

   3. Kumasabhabha [ ] 4. Kumacheto kwedhorodha [ ]

8. Muri vechitendero chipi? 1. Chivanhu[ ] 2. Chipositori[ ] 3.Machechi okutanga(Orthodox, muenzaniso Roman Catholic, Reformed church, Methodist) [ ] 3. Pendekosita[ ]

   4.Machechi akabudamunedzimwe(Protestant) [ ] 5. Handina chitendero[ ]

   6.Zvimwewo(tsanangurai)_____

9a) Munotambira marii pamwedzi emadhora okuAmerica?

1. Iri pasi pezana(<100) [ ] 2. Iri pakati pezana namakumi maviri(100-200) [ ]

3. Iri pakati pemazana matatu nemazana mashanu(300-500) [ ] 4. Pamusoro pemazana mashanu[ ]

b)Ndedzipidzimwe nzira dzamunowana nadzo mari?_____

CHIKAMU CHECHIPIRI: RUZIVO PAMUSORO PECHIRWERE CHESHUGA

10a) Munoziva kuti chirwere cheshuga chinokonzerwa nei here?

1. Hongu 2. Kwete

10b) Kana pamati, ‘’Hongu” pamusoro tsanangurai kuti chinokonzerwa nei?

_____

11.Ndezvipi zvinotaridza kuti shuga yakakwira kana kuti yakadereresa?

1.Kudedera [ ] 2.Kudikitira [ ] 3. Kutemwa nomusoro [ ] 4.Kupera samba [ ]

5.Kunzwa nyota [ ] 6. Kugara achirasa mvura/ weti [ ]

7. Kunzwa nzara nguva nenguva[ ] 8. Kupera muviri [ ] 9.Zvimwewo (*Tsanangurai)*_____

12.Ndezvipi zvinogona kuitika kana munhu ane chirwere ichi? 1.Kufa[ ]

2.chirwerechomoyo [ ] 3. Chirwere cheitsvo [ ] 4.Kugurwa makumbo[ ]

5.Kusabara[ ] 6. Kukanganwa[ ]

7. Kupofomara maziso/kusaona[ ]8Zvimwewo(tsanangurai)_____

CHIKAMU CHECHITATU: MATORERO AMUNOITA MISHONGA

13. Muri kushandisa mhandoi yokurapwa?

a) Zvokudya1. Hongu [ ] 2. Kwete [ ]

b) Mapiritsi 1. Hongu [ ] 2.Kwete [ ]

c)Kuzvibaya 1.Hongu [ ] 2.Kwete [ ]

d) Mapiritsi nekuzvibaya 1. Hongu [ ] 2. Kwete [ ]

Kune avo vari pamapiritsi nekuzvibaya

14. Ndeipi mishonga yamuri kutora pari zvino(*Tarisa kadhi romurwere*)

Mushonga	Hongu	Kwete
1.Metformin		
2.Acarbose		
3.Atrapid		
4.Glibenclamide		

5.Glipizide		
6.Insulin(protaphane/actraphane		
7. Mimwewo mishonga		

15. Munofanira kunwa mishonga iyi kangani pazuva?

1. Kamwechete [ ] 2. Kaviri [ ]

3. Katatu [ ] 4. Kana [ ]

16.Vanhu vazhinji vane dambudziko rokukanganwa kunwa mishonga yavo, ko imi munombokanganwa kunwa mushonga wenyu mwedzi wapfuura here?

1.Hongu [ ] 2. Kwete [ ]

17.Munombopota muchiregera mushonga here panguva dzamunenge muchinzwa zvakanaka?

1.Hongu [ ] 2. Kwete [ ]

18. Kana mushonga ukakurwadzai munoregera kuunwa mega kumba here?

1. Hongu [ ] 2. Kwete [ ]

19. Muri kunyatsodya izvo makakurudzirwa nachiremba kana varapi here?

1. Hongu [ ] 2. Kwete [ ]

Kana mati, “Kwete”endai pamubvunzo unotevera.

20a). Kana muchinge mati, Hongu”’muri kunyatsodyazvokudya zvinokurudzirwa kuvanhu vana chirwere cheshuga here? (Munogona kusarudza mhinduro dzinopfuura imwe chete) 1 Kudya kune sitachi nefaibha yakawanda[ ] 2. Kudya kune mafuta mashoma [ ] 3. Michero nemiriwo[ ]

4.Kumira kunwa zvinodhaka kana kuputa fodya[ ] 5 Kudya zvokudya zvine tsvigiri nemafuta akawanda[ ] 6 Kudya chero zvokudya zvamawana [ ]

7. Zvimwewo(tsanangurai) _____

20b) Mune dambudziko here roregedza kudya zvamaigara muchidya?1.Hongu [ ]

2. Kwete[ ]

21a) Mumboita maekisesaizi(kutwasanudza nhengo dzomuviri) here?. 1. Hongu [ ] 2 Kwete [ ]

21b)Kana muchinge mati , "Hongu" ndezvipi zvamunoita?

1. Kufamba [ ] 2. Kuchovha bhasikoro[ ] 3. Kuuruka[ ] 4.mitambo [ ] 5 Zvimwewo(Tsanangurai)_____

22a). Munoita kwenguva yakareba zvakadii? 1. Maminetsi ari pekati pegumi negumi namashanu [ ] 2.maminetsi ari pakati pemakumi maviri nemakumi matatu[ ] 3. Maminetsi anopfuura makumi mana nemashanu [ ]

22b). Mune dambudziko rokuita zvakasiyana-siyana zvinobatsira kutwasanudza nhengo dzomuviri wenyu here? 1.Hongu [ ] 2. Kwete [ ]

CHIKAMU CHECHINA ZVECHITENDERO, TSIKA NEMAGARIRO

23 Maonero kana mafungiro enyu pamusoro pezvinokurudzirwa kana kudziviswa vanhu vane chirwere cheshuga 1. Handitenderani nazvo 2. Handisati ndanyatsofungisisa nezvazvo 3. Ndinotenderana nazvo 4. Ndinotenderana nazvo zvakasimbisisa.

24a). Kutevedzera izvo zvinokurudzirwa kuvanhu vane chirwere cheshuga munoona zvichibatsira here? 1.Hongu [ ] 2. Kwete [ ]

24b). Chitendero chenyu chine zvachinomutadzisai here maererano nokutevedzera izvo munokurudzirwa kuita navarapi here?

1.Hongu 2. Kwete

24c). Mati mambobatsirwa kumapostori here pamusoro pechirwere cheshuga ichi?

1. Hongu [ ] 2.Kwete [ ]

24d). Makamboshandisa mishonga yechivanhu here kurapa chirwere ichi?

1. Hongu mazuva ano [ ] 2. Hongu kare [ ] 3. Kwete [ ]

Maonero enyu kukwanisa kwenyu (Self-efficacy)

Taridzai nokumaka pachikero chinobva motsi kusvika shanu zvamunogona kuita muchitevedzera zvamakanzi muite (1- kuramba zvakanyanya; 5- kubvuma zvakanyanya)

31a) Ndine chokwadi chekuti ndinogona zvakanyanya kunwa mishonga zvakafanira

1 2 3 4 5

b). Ndine chokwadi kuti ndinogona kutora zvokudya zvandakakurudzirwa nanachiremba.

1 2 3 4 5

c). Ndine chokwadi kuti ndinoita maekisesaizi andakanzi ndiite nanachiremba

1 2 3 4 5

Zvinokutadzisai kutevedzera zvinodikanwa(Perceived barriers)

32. Kana mati mune dambudziko rokutora mishonga, ndezvipi zvinokutadzisai musanyatsotora mishonga yenyu zvakanaka? Sarudzai zvose zvamunofunga kuti zvakakodzera (Makai zvose zvakakodzera)

1. Kushaya nguva nebasa [ ] 2. Mamiriro ekunze kunyanya kutonhora [ ]

3. Kushaya murume/mukadzi anokukurudzira [ ] 4. Kufamba nzendo/kufudza mombe /kurima [ ] 5 Kusvorwa nevamwe kunoita kuti ndisanyatsosunungka kuita zvandinokurudzirwa [ ] 6. Zvimwewo.....

33**.** Pane zvinotevera ndezvipi zvinokukanganisai/tadzisai kutevedzera zvokudya zvamunokurudzirwa.

1. Kudya kunze(dzimba dzinotengesa zvokudya, mitambo, basamhuri, nekudzimba dzeshamwari

[ ] 2. Kutora tumwe twokudya pakati penguva [ ] 3. Kushaya mari yokutenga zvokudya zvinokurudzirwa [ ] 4 Kusakwanisa kuzvidzora [ ]

34.Ndezvipi zvinoitika kana mukadya zvokudya zvisingabvumirwi kuvanhu vane chirwere cheshuga?_____

35.Ndezvipi zvinoitika kana mukasaita maekisesaizi?_____

CHIKAMU CHESHANU: ZVECHIRWERE NAMARAPIRWO ACHO ZVINOTADZISA KUTEVEDZWA KWEZVINOKURUDZIRWA

34a) Ndezvipi zvimwe zvirwere zvamuinazvo?.....

b) Kana mati, ‘’Hongu,’’ndezvipi zvimwe zverwere zvamuinazvo?_____

35. Mune imwe mishonga yamuri kutora here isiri yokurapa chirwere cheshuga?

1. Yokuderedza marwadzo 2.Yokuwedzera havi yechikafu 3. Yokurapa chirwere cheshura matongo 4.Yokurapa chirwere chorurindi 5. Yokurapa zvimwewo zvirwere

b)Kubva pane zvinotevera, taridzai zvikonzero zvinoita kuti musanyatsotora mishonga yenyu. *Makai mhinduro dzinokodzera.*

1. Kutora mishonga yakanyanyowanda [ ] 2. Kuzvibaya [ ] 3. Kusawirirana nemishonga(side effects) [ ] 4. Kungozvipa mvumo (kamwe chete chete here, zvishoma hazvikuvadzi) [ ] 5. Kunyanyorwarisa [ ]

35. Munoona sokuti kuita maekisesaizi anowedzera kurwadziwa 1. Hongu [ ]

2 . Kwete [ ]

CHIKAMU CHECHITANHATU: RUTSIGIRWO KUBVA KUNE VAMWE

36. Muri muboka revanhu vane chirwere cheshuga here?

1. Hongu 2. Kwete

37. Makambonzwa nezvemapoka akadaro here?

1. Hongu 2. Kwete

38.Pane vamakataurira here kuti mune chirwere cheshuga?

1. Murume/mudzimai wangu 2. Vana vangu 3. Hama dzepedyo 4.Hama dzekure 5. Shamwari 6.Vekubasa 7 Vekuchechi

CHIKAMU CHECHINOMWE: ZVECHIPATARA ZVINOBATSIRA KUTEVEDZERA ZVINODIKANWA

39. Zvinotora nguva yakareba zvakadii kuti mupedzerwe pamunouya kuzorapwa kazhinji?

1. Maminitsi mashoma 2. Kunge awa imwe 3. Maawa 1-2 4. Maawa 2- 4 5.Kudaridza maawa

40.Munoti chii nemabatirwo enyu nevarapi kubva pamasvika pano? Ipai zvibozwa 1-5 (*1.Akaipisisa; 5 Akanakisisa)*1 2 3 4 5

41. Munowanzotaura navarapi nerurimi rwenyu here?

1. Hongu [ ] 2. Kwete [ ]

42.Mava nenguva yakareba zvakadii mapedzisira kuonekwa nachiremba 1. Iri pasi pemwedzi mitatu [ ] 2 Inopfuura mwedzi

6a) Munoonekwa nachiremba here pamunouya kuzorapwa?

1. Nguva dzese [ ] 2. Kazhinji [ ] 3. Kashoma [ ] 4. Handisati [ ]

41. a) Munobhadhara here kuti muonekwe kwamunowanza kurapirwa?

1. Hongu [ ] 2. Kwete [ ]

b) Kana mati hongu, munobhadhara mari? c) Zvinokuitirai nyore here kubhadhara mari iyi? 1. Hongu [ ] 2. Kwete [ ]

42a) Mishonga yenyu munoiwana kupi? (*Makai mhinduro dzakakodzera*)

1.Mutare Provincial hospital [ ] 2. machemistry/pharmacy [ ]

3. vanotengesa mumigwagwa [ ] 4. Pakiriki iri pedyo [ ]

b)Munobvisa mari here yokutenga mishonga iyi? 1. Hongu [ ] 2. Kwete [ ]

c) Zvinokuitirai nyore here kubhadhara mari idzi?

1. Hongu [ ] 2. Kwete [ ]

43. Kubva zvamakabatwa nechirwere cheshuga, makambodziziswa here pamusoro pekunwa mishonga semanwiro anenge anzi aitwe?

1. Hongu [ ] 2. Kwete [ ]

44. Makambodzidziswa here nezvokuita maekesesaizi? 1 Hongu [ ] 2 Kwete [ ]

45.Makambodzidziswa kana kupiwa magwaro anodzidzisa nezvekudya zvevanhu vane chirwere cheshuga here? 1. Hongu [ ] 2. Kwete [ ]

46. Mumwedzi mitanhatu yapfuura makambopiwa zvidzidzo zviri maererano nechirwere chenyu here?1. Kwete [ ] 2. Kamwe chete [ ] 3.Katatu[ ] 4. Kanopfuura katatu [ ]

MAZVITA HENYU NENGUVA YENYU

APPENDIX V: INTERVIEW GUIDE FOR KEY INFORMANTS

1.What is your opinion about adherence to treatment recommendations among diabetic patients attending this clinic?.....

.....

2. What can you say about the availability of anti-diabetic drugs at this health facility?.....

3. Does the hospital have enough resources for management and control of diabetes

4.How often do you have diabetic education sessions?

5.What are the constrains you encounter in managing patients with diabetes?

.....

6.What do you think hinder patients from adhering to treatment recommendations?

A)drugs.....

B)Diet.....

C)Exercise.....

7.What challenges are you facing in maintain the Diabetic clinic?.....

8. What should be done to improve adherence among diabetic patients?

.....

THANK YOU VERY MUCH FOR YOUR TIME

APPENDIX VI: CHECKLIST ON RESOURCE AVAILABILITY

Name of health facility: MUTARE PROVINCIAL HOSPITAL

Date of interview: | | | |

(*The investigator should observe if the materials available or not*)

Record cards

1. Reports 1) available [ ] 2) not available [ ]
2. Minute books 1) Available [ ] 2) not available [ ]
3. Diabetic Mellitus 1) available [ ] 2) not Available [ ]

Testing materials

1. Glucometers 1) available [ ] 2) not Available [ ]
2. Have testing sticks 1) available [ ] 2) not Available [ ]
3. Have pricking needles 1) available [ ] 2) not available [ ]
4. Protective clothing: gloves 1) available [ ] 2) not Available [ ]
5. Spirit and alcohol swabs 1) available [ ] 2) not Available [ ]

IEC Material on diabetes

1.Leaflets 1) available [ ] 2) not available [ ]

2. Booklets 1) available [ ] 2) not Available [ ]

3. Posters 1) available [ ] 2) not available [ ]

4. Flowcharts 1) available [ ] 2) not available [ ]

5. Flip charts 1) available [ ] 2) not available [ ]

6. Newsletter for clinic provider 1) available [ ] 2) not available [ ]

Drug availability

1 .Available drugs ……

2. How are drugs stored?

3. Are they kept cool Yes [ ] No [ ]

4. Are they kept in dark Yes [ ] No [ ]

5. If no drugs are available, what are the reasons?.....

……

6. Which oral diabetic antigens combination are the patients currently taking?

(*Review the patient's records)*

Drugs: How often do they take them?

1) Metformin [ ] Once [ ] Twice [ ] Thrice

2) Glibenclamide [ ] Once [ ] Twice [ ] Thrice

3) Protaphane [ ] Once [ ] Twice [ ] Thrice

4) Atrapid [ ] Once [ ] Twice [ ] Thrice

APPENDIX VII: MUTARE PROVINCIALHOSPITAL DIET SHEET

DATE: _____DIETICIAN_____

1.VANORWARA NECHIRWERE CHESHUGA HAVABVUMIRWE KUDYA IZVI:

Shuga, ipwa, nzimbe, zviwitsi, chocolate, jam, huchi,syrup, condensed milk, mukaka weupfu unotapira,makeke, doughnuts, ice-cream, puddings, freezits nezvimwewo zvinotapira.

MINERALS: Coke, Fanta, Sprite, Lemon twist, cream soda, tonic water, ginger ale, lemonade, ginger beer, zvimwe zvakatapiriswa seMazoe orange crush, Raspberry, Quench, Calypso, Mahewu ane sugar,Milo Neaquick uye doro rechivanhu nerechirungu.

2.VANORWARA NECHIRWERE CHESHUGA NGAVADYE IZVI:

Miriwo yose, nyama isina kukora, hove,nyama yehuku isina ganda, mazai, cheese,dove,nzungu nemichero yakaita semakotapeya, mabanana,apples. Isai mafuta mashoma.

ZVINWIWA: Diabetic mazoe Orange/Diabetic mazoe lemon, Diet Coke, Pepsi, Soda water, tea isina shuga, coffee isina shuga, Spax canderel, dzinongogona kutora nzvimbo yeshuga. Shandisai idzodzo pazvinokodzera uye dzinowanikwa kumachemist. Mito yemichero yakaita sePure Joy, Ceres,Liquifruit,inogona kushandiswa.

MUENZANISO WEZVOKUDYA MANGWANANI, MASIKATI NEMANHERU:

MANGWANANI:

- Kapu imwe yebota/kana kuti zvidimbu zvechingwa chebrown chine margarine kana dovi.
- Kapu imwe yomukaka
- Zai rimwe rakafashsidzwa.
- Tea ine mukaka isina shuga

10 O'clock

MASIKATI:

Kapu yesadza kana kuti zvidimbu zvechingwa chebrown, nyama yehuku, hove kana kuti kapu imwe chete yemukaka wakakora. Muriwo(vegetables) wakawanda.

4 O' Clock

MANHERU:

Kapu imwe yesadza kana kuti kapu yemupunga, kana kuti kapu yemanhuchu, kana kuti kapu yespagheti,kapu yambatatisidiki, kana kapu yesadza ine kapu yebeans, kana nyimo,nyama,hove,huku. Idyai ne muriwo wakawanda.

PAKURAPA:

Mirairidzo(Instructions):

1. Idyai zvekudya zvemangwanani nezvamasikati ne manherumusingadarikire.
2. Musarege kunwa mapiritsi enyu eshuga kana kuzvibaya jekiseni.
3. Musadye zvakapfuuridza chipimo chamarongerwa.
4. Rongerwai zvokudya nadietian kana Hospital Food services supervisor.

5. Hupfu hwemugaiwa, nechingwa chebrownzviri nai pane kudya chingwa chichena kana Parlenta.
6. Shandisai mafuta kana margarine mashoma pakubika.
7. Garai mutwasudza nhengo dzemuviri(Exercise).

4.BREAD EXCHANGE

1.Pisi imwe chete yechingwa chine margarine. 2. Pakiti imwe chete yemaputi 3.kapu yemaheu 4.1 banana 5. 1 apple,1 orange,1 mango diki 6. 1 kapu bota 7.Mbambaira duku imwe chete 8. Chidimbu chimwe chete chenhanga 9.Girazi remukaka 10. Kapu diki izere nemutakura 11.½ muguri wechibage chinyoro 12.Chikomichi chemangai.

HYPOGLYCAEMIA

ZVINORATIDZA SHUGA YAKADERERA MUROPA:

-Hasha, Kuderera, Kudikitira, Dzungu, Kunzwa kuda kurara, Kucheneruka, Kutemwa nomusoro

Kana mukaona zvava kuitika kasikai kutora:

Tea spoon imwe yeshuga **Kana** Cup yemahewu **Kana** Chidimbu chechingwa(1 slice).

HYPERGLYCAEMIA

ZVINORATIDZA KUTI SHUGA YAWANDISA MUROPA:

Kuoma mate mukanwa, Kuneta nekunzwa kuda kurara, Kunzwa nyota, Kuita weti kakawanda, Kupera muviri, Kuvaviwa panhengo yomuviri inoita weti.

NB Shuga yakawanda muropa inokuvadza muviri naizvozvo garai makaongororwa shuga yenyu.

APPENDIX VIII – MAP OF MANICALAND PROVINCE

APPENDIX IX: APPROVAL LETTERS

1. Approval letter from the Medical Research Council of Zimbabwe.
2. Letter seeking permission from the Provincial Medical Director Approval
3. Letter from the Provincial Medical Director of Manicaland
4. Approval letter from the Medical Superintend of Mutare provincial Hospital
5. Approval letter from the Faculty of Health Sciences.

Telephone: 791792/791193
Telefax: (263) - 4 - 790715
E-mail: mrcz@mrczimshared.co.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

MRCZ APPROVAL LETTER

Ref: MRCZ/B/298 **13 February 2012**

Winnie Mandewo
Africa University
Faculty of Health Sciences
Mutare
Zimbabwe

RE: Non-Adherence to Treatment Among Diabetic Patients Attending Outpatients Clinic at Mutare Provincial Hospital, Manicaland Province, February to March 2012

Thank you for the above titled proposal that you submitted to the Medical Research Council of Zimbabwe (MRCZ) for review. Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above titled study. This is based on the following documents that were submitted to the MRCZ for review:

a) Study protocol.

- **APPROVAL NUMBER : MRCZ/B/298**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **APPROVAL EFECTIVE DATE : 13 February 2012**
- **EXPIRATION DATE : 12 February 2013**
- **TYPE OF MEETING : Expedited**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted one month before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices.
- **MODIFICATIONS:** Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY:** On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices.
- **QUESTIONS:** Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@mrczimshared.co.zw.
- **Other**
- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
1 3 FEB 2012
APPROVED
P. O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH
Registered with the USA Office for Human Research Protections (OHRP) as an International IRB (Number IRB00002409 IORG0001913)

6.

Winnie Mandewo

Africa University: Faculty of Health Sciences

P. O. Box 1320

Mutare

19 January 2012

The Provincial Medical Directorate

P.O. Box 323

Mutare

Dear Sir,

RE: APPLICATION FOR PERMISSION TO CARRYOUT A STUDY ON DIABETES AND ADHERENCE TO TREATMENT AMONG DIABETIC VISITING MUTARE PROVINCIAL HOSPITAL

I am a Master in Public Health student at Africa University attached to the PMD Manicaland and I write to seek permission to carry out a study on diabetes and adherence to treatment among patients visiting Mutare Provincial Hospital. I also write to seek permission to have access to Diabetic Clinic medical records, registers, diabetes care and management, counselling, access stock level data from the pharmacy, interview heads of departments, nurses, doctors, and also to interview diabetic patients visiting the Outpatients clinic and patients not adhering to treatment living in suburbs around Mutare urban and peri-urban from 19 January up to April 2012,

I look forward to your favorable response.

Thank you.

Yours faithfully

Winnie Mandewo (MPH Officer)

The Provincial Medical Directorate

P.O. Box 323

Mutare

19 January 2012

Medical Superintendent

Mutare Provincial Hospital

P.O. BOX 95

Mutare

Dear Medical Superintendent,

RE: ATTACHMENT TO CARRYOUT A STUDY ON DIABETES AND ADHERENCE TO TREATMENT

Please allow Winnie Mandewo, Masters in Public Health student at Africa University attached to PMD Manicaland to carry out her study on diabetes and adherence to treatment at Mutare Provincial Hospital. Allow her access to diabetic clinic records, registers, patient records, observe the whole process of diabetes management, visit wards to interview admitted diabetic patients, access stock level data from the pharmacy, interview heads of departments, nurses, doctors, primary counsellors and also to interview patients visiting the Outpatients clinic and to attend diabetic clinic which takes place every month. Assist her in any way possible.

Your cooperation is greatly appreciated.

Thank you.

PMD(DR M. CHEMHURU)

AFRICA UNIVERSITY
(A United Methodist-Related Institution)
Investing in Africa's Future

FACULTY OF HEALTH SCIENCES

P.O. BOX 1320, MUTARE, ZIMBABWE - OFF NYANGA ROAD, OLD MUTARE, ZIMBABWE
TELEPHONE: (263-20) 60076/60026/61611/61618 - FAX: (263-20) 61785/63284 - E-MAIL: deanfhs@africau.ac.zw, dfmssec@africau.ac.zw

28 February 2012

The National Coordinator
Medical Research Council
Josiah Tongogara/Mazoe Street
HARARE

Dear Sir

RE: WINNIE MANDEWO R054044MH

This letter serves to confirm that Winnie Mandewo R054044MH is a final year Masters in Public Health student at Africa University, Faculty of Health Sciences in the Department of Public Health. She intends to carry out a Dissertation on Non-Adherence to treatment Among Diabetic Patients Attending Outpatients Clinic at Mutare Provincial Hospital, Manicaland Province between February and April 2012. May you please assist her with all the necessary and relevant information she might need for the research.

Thank you in advance for the support to the student.

Yours Sincerely

PP Assistant Dean

DR P. O FASAN
DEAN, FACULTY OF HEALTH SCIENCES