

REPORT ON THE RAPID ASSESSMENT PROTOCOL FOR INSULIN ACCESS IN MOZAMBIQUE

2009



REPÚBLICA DEMOÇAMBIQUE
MINISTÉRIO DA SAÚDE

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With the support of Diabetes UK



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List of Abbreviations

AMODIA	Associação Moçambicana dos Diabéticos (Association of Mozambican Diabetics)
BMI	Body Mass Index
CMAM	Central de Medicamentos e Artigos Medicos (Central Medical Store)
FBG	Fasting Blood Glucose
GDP	Gross Domestic Product
HbA1c	Glycosylated Haemoglobin
IDDM	Insulin Dependent Diabetes Mellitus (Type 1 diabetes)
IDF	International Diabetes Federation
IGT	Impaired Glucose Tolerance
IIF	International Insulin Foundation
MISAU	Ministério de Saúde (Ministry of Health)
MISAU	Ministério da Saúde, Ministry of Health
NCD	Non Communicable Disease
NIDDM	Non Insulin Dependent Diabetes Mellitus (Type 2 diabetes)
PARPA	Poverty Reduction Plan
PPP	Purchasing Power Parity
RAPIA	Rapid Assessment Protocol for Insulin Access
RBG	Random Blood Glucose
WDD	World Diabetes Day
WDF	World Diabetes Federation
WHO	World Health Organisation

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Executive Summary

Following the implementation of the Rapid Assessment Protocol for Insulin Access in 2003 many developments with regards to diabetes and Non Communicable Diseases took place in Mozambique. As part of the National Plan on Non Communicable Diseases a reassessment using the RAPIA was carried out in order to assess progress in the area of diabetes and provide a “lessons learnt” for the implementation of programmes and projects for other Non Communicable Diseases and also contribute to the ongoing projects with regards to diabetes.

What is clear from this assessment is that much progress has been made in Mozambique with regards to diabetes and Non Communicable Diseases in the period 2003-2009. In 2003 many issues were present including serious problems with access to medicines, training, patient education, etc. These problems have now been addressed and the foundations for a system to tackle the growing burden of diabetes are established. The recommendations presented in this report aim to build on these successes, reinforce and expand existing initiatives as well as develop new programmes to address new and continuing deficiencies.

The progress made in Mozambique in addressing the growing challenge of diabetes and Non Communicable Diseases should be applauded as the positive developments need to be put into context of a health system where the burden and attention remains linked to communicable diseases and only US\$ 3.00 is spent per person per year on providing healthcare.

With the foundations of proper management of diabetes having been created, the next phase should focus on fine-tuning and improving the measures implemented to date as well as integrating these with the National Non Communicable Disease Plan. The action plans detailed in “Section 9. Action Plans” build on this as well as the recommendations described in “Section 7. Recommendations”. These are specifically for the areas visited during the 2009 implementation of the Rapid Assessment Protocol for Insulin Access, but can be applied and adapted to other areas where necessary.

Key Findings

- Organisation of the Health System
 - o Development of chronic consultations at different levels of the Health System in Maputo
 - Some problems with staff originally trained for this role no longer present
 - o Close collaboration between Maputo Central Hospital and Mozambican Diabetes Association
 - o Mozambican Diabetes Association provides the main consultation for diabetes in Maputo
 - o Care for Type 1 diabetes based mainly at Maputo Central Hospital and Mozambican Diabetes Association
 - o In Beira the main location for diabetes care is at Beira Central Hospital
 - Problems with staffing
 - o No clear management of diabetes in Lichinga
 - Some patients seen at Hospital others at Health Centre
 - o In Xai-Xai there is no real organisation of diabetes care at the hospital
 - o There was a chronic consultation at the Xai-Xai City Health Centre, but now people with diabetes mixed with all other patients
- Data Collection
 - o WHO STEPS Methodology and Rapid Assessment Protocol for Insulin Access enabled baseline data on diabetes to be collected

- At all levels patient files and clinical registers could be found
 - Hard to use these as amalgamation of consultations versus patient numbers
 - Data not used in decision making
- Prevention
 - Organisation of World Diabetes Days and “Health Fairs”
 - Lack of tools for diagnosis and management of complications
- Diagnostic tools and infrastructure
 - Availability of diagnostic tools has improved since 2003
 - Problems remain with strips for glucometers
- Drug procurement and supply
 - No problems with cold chain
 - Unequal distribution of insulin and medicines
 - Irregular demand for mainly insulin, but also for oral medicines
 - Problems with supply of syringes
- Accessibility and affordability of medicines and care
 - Insulin available at 100% of hospitals visited
 - 73% of public facilities visited had Glibenclamide and 53% had Metformin
 - Implementation of 5 Mts (US\$ 0.20) prescription fee
- Healthcare workers
 - Since 2003 one particular aspect that the Ministry of Health has focused on is training
 - Involvement of Mozambique with International Diabetes Federation AFRO in a number of key regional initiatives
 - Healthcare workers in all Provinces in Mozambique have received training in diabetes and hypertension (total of 247)
- Adherence issues
 - Main problem with adherence is poor knowledge/understanding of diet
- Patient education and empowerment
 - 10 members of AMODIA have been trained as expert patients
 - Development of training materials
- Community involvement and diabetes association
 - Three branches of the Diabetes Association now exist
 - AMODIA Maputo has now become a “one stop clinic” for diabetes care
 - Problems with management exist at all branches
- Positive policy environment
 - Since 2003
 - Creation of the Non Communicable Disease Department within the Ministry of Health
 - Approval in 2008 of the National Strategic Plan for the Prevention and Control of Non Communicable Diseases

Key Recommendations

- Organisation of the Health System
 - Strengthen management of diabetes at health facilities
- Data Collection
 - Increase in training for various personnel with regards to the importance of data collection and its use
 - Reporting back to those who collect data
- Prevention
 - Develop materials adapted to local diet
 - Involve nutritionist in diabetes consultations

- Diagnostic tools and infrastructure
 - o Standardisation of glucometers available in public sector
 - o HbA1c available at Central and Provincial Hospitals
 - o Development of a “toolkit” for detection of diabetes complications
- Drug procurement and supply
 - o Training and information of people involved in meds supply about different types of insulin
 - o Investigate applicability of supply system for HIV/AIDS meds and its applicability to diabetes
 - o Investigate problem with supply of syringes
- Accessibility and affordability of medicines and care
 - o Clarify regulation of 1 Mts or 5 Mts prescription fee for people with diabetes
 - o Discuss issue of Diabetes Association membership fee being viewed as a payment for care
- Healthcare workers
 - o Education adapted to each level of the health system and type of healthcare worker
 - o Increase on the job training at the Provincial level
 - o Increase practical and organisational training
- Adherence issues
 - o Develop materials for patient education
 - o Improve healthcare worker training
 - o Involve nutritionists in diabetes care
 - o Improve training of patient educators on these issues
- Patient education and empowerment
 - o Increase number of trained people with diabetes
 - o Involve AMODIA in patient education in all facilities
- Community involvement and diabetes association
 - o Improve management
 - o Define roles of AMODIA, clinicians and MISAU through renewing memorandum of understanding detailing the roles and responsibilities of each partner
- Positive policy environment
 - o Wide dissemination of National Non Communicable Disease plan

Introduction

Following the implementation of the Rapid Assessment Protocol for Insulin Access in 2003 many developments with regards to diabetes and Non Communicable Diseases took place in Mozambique. As part of the National Plan on Non Communicable Diseases a reassessment using the RAPIA was carried out in order to assess progress in the area of diabetes and provide a “lessons learnt” for the implementation of other programmes and projects for Non Communicable Diseases and also contribute to the ongoing projects with regards to diabetes.

This report presents the results from this current assessment and a comparison between 2003 and 2009 using the framework of the Diabetes Foundation Report on implementing national diabetes programmes in sub-Saharan Africa and its 11 elements seen as key to a “positive diabetes environment”. (1)

1. Organisation of the Health System
2. Data Collection
3. Prevention
4. Diagnostic tools and infrastructure
5. Drug procurement and supply

6. Accessibility and affordability of medicines and care
7. Healthcare workers
8. Adherence issues
9. Patient education and empowerment
10. Community involvement and diabetes associations
11. Positive policy environment

What is clear from this assessment is that much progress has been made in Mozambique with regards to diabetes and Non Communicable Diseases in the period 2003-2009. In 2003 many issues were present including serious problems with access to medicines, training, patient education, etc. These problems have now been addressed and the foundations for a system to tackle the growing burden of diabetes are established. The recommendations presented in this report aim to build on these successes, reinforce and expand existing initiatives as well as develop new programmes to address new and existing deficiencies.

It is clear that Mozambique has now developed the foundations to address the increasing burden of diabetes and other Non Communicable Diseases.

1. Background Information

1.1. Diabetes

Diabetes is a chronic disease defined by high blood glucose levels. This high level of glucose is because people with diabetes cannot use the glucose from digested food as energy for their cells. Insulin is the key molecule allowing glucose to be used by the body's cells.

Type 1 diabetes (formerly Insulin Dependent Diabetes Mellitus, IDDM or child onset diabetes) is a life-long condition, affecting children, young people and adults worldwide. The disease is recognised by a loss of control over the use of the body's glucose and other fuels and is due to the destruction of insulin producing cells in the pancreas (pancreatic islet beta cells).

Insulin is vital for the survival of people suffering from Type 1 diabetes and in some people suffering from Type 2 diabetes (formerly Non Insulin Dependent Diabetes Mellitus, NIDDM). Type 2 diabetes can be managed with a combination of diet and lifestyle modifications, as well as oral medications and in some cases insulin. However, also of central importance for the management of diabetes are the means to administer insulin (syringe/needles), the means to monitor the effectiveness of insulin (blood/urine tests) and an understanding of the interaction between insulin and life and work of the individual and vice-versa (training of healthcare workers and patient education).

In both Type 1 and Type 2 diabetes the result of inadequate care (elevated levels of blood glucose) lead to serious health complications such as blindness, kidney failure, nerve disease, limb amputation, heart attacks, strokes and premature death.

Due to the increase in "Western" lifestyles the prevalence of Type 2 diabetes is becoming a major Public Health concern in many developed and developing countries. "Diabetes is a major threat to global public health that is rapidly getting worse, and the biggest impact is on adults of working age in developing countries. At least 171 million people worldwide have diabetes. This figure is likely to more than double by 2030 to reach 366 million." (2) On the 20th of December 2006, the United Nations' General Assembly passed a Resolution recognising diabetes as a chronic, debilitating and costly disease associated with major complications that pose severe

risks for families, countries and the entire world and calls on Member states to “develop national policies for the prevention, treatment and care of diabetes in line with the sustainable development of their health-care systems, taking into account the internationally agreed development goals including the Millennium Development Goals”. (3)

1.2. Insulin

Insulin is a hormone, normally made by the pancreas, which regulates glucose metabolism. Insulin is a treatment for diabetes and not a cure and is administered by daily injections throughout the life of the patient. Dosage of insulin injected by the patient varies from person to person based on, age, nutritional status and activity.

Without insulin, people with Type 1 diabetes die very quickly; meaning multiple daily injections of insulin are necessary for life. Some people with Type 2 diabetes need insulin for good metabolic control, but there is not the same urgency. Due to this insulin is listed on the World Health Organization’s (WHO) Essential Drug List.

Insulin can be produced through the extraction and purification of animal pancreases or nowadays through bioengineering.

By different chemical preparations or genetic engineering, four basic types of insulin with their respective onset, peak and duration of action, are currently produced. These are:

- **Rapid-acting (Rapid insulin analogs):** begins to work after 15 minutes, peaks in 30 to 90 minutes, and has a duration of three to four hours.
- **Short-acting (Regular insulin):** begins to work in 30 to 60 minutes, peaks in two to three hours, and has a duration of three to six hours.
- **Intermediate-acting (NPH):** begins to work in 90 minutes to six hours, peaks in four to 14 hours, and has a duration of up to 24 hours.
- **Long-acting:** begins to work after 1 hour, has no peak, and remains effective for 24 to 36 hours.

Many people with diabetes use combinations of these different types of insulin to better control and manage their condition. (4)

1.3. Type 1 diabetes and insulin in developing countries

Leonard Thompson, a Canadian child, was given his first injection of insulin on 11 January 1922. He was the first patient to be treated with insulin for Type 1 diabetes. Having survived some 2½ years from his diagnosis, he had done better than most people with Type 1 diabetes patients in the pre-insulin era.

Insulin was discovered by Banting and Best in 1921 and became widely available in the “West” from 1922 onwards. (5) The International Diabetes Federation (IDF) estimates that in Africa there are approximately 38,800 prevalent cases of Type 1 diabetes. (6) Many studies have found that people requiring insulin in sub-Saharan Africa face restricted availability. (7; 8; 9) This leads to the estimated life expectancy of a child with newly diagnosed Type 1 diabetes in much of sub-Saharan Africa may be as short as one year or less. (10)

1.4. International Insulin Foundation

The International Insulin Foundation (IIF) was established by leading academics and physicians in the field of diabetes with the aim of prolonging the life and promoting the health of people

with diabetes in resource poor countries by improving the supply of insulin and education in its use.

In order to achieve these objectives, a clear analysis of the constraints to insulin access and diabetes care is needed. The IIF's view is that increasing the supply of insulin through donations or other means, however generous, offers only temporary relief and that the root of the problems of insulin supply and diabetes care need to be identified and tackled. This led the IIF to develop the Rapid Assessment Protocol for Insulin Access (RAPIA). (11)

Mozambique was the first country where the RAPIA was implemented. Since this implementation the RAPIA has been carried out in Mali, Nicaragua, Vietnam, the Philippines and Zambia.

1.5. Diabetes UK and Mozambique

Since 2007 Diabetes UK has supported a "Twinning Project" with Mozambique under the auspices of the IDF's Task Force on Insulin and other diabetes related supplies. (12; 13) The objectives of this project are:

1. Support for the training of trainers programme initiated by the Ministry of Health (MISAU)
2. Further training of healthcare workers through different options e.g. sending them to Tanzania, training organised in Mozambique by someone external, specialised training.
3. Diabetes UK literature made available to Associação Moçambicana dos Diabéticos (Mozambican Diabetes Association, AMODIA) with appropriate adaptation and translation
4. Organisation of World Diabetes Day events
5. Advocacy and policy support to MISAU
6. Develop core group of people involved in diabetes. This should include people from the Ministry of Health, Clinicians and people with diabetes.
7. Development of AMODIA
8. Long term research programmes in Mozambique in Health Services and Basic Science

In addition to this support the World Diabetes Foundation (WDF) has supported similar activities in Mozambique.

1.6. Rapid Assessment Protocol for Insulin Access – method of assessment

The aim of the RAPIA (11) is to serve as a practical field guide to assist teams in the collection, analysis and presentation of data to evaluate and inform the development of health care services for diabetes management in low and middle income countries.

The RAPIA is structured as a multi-level assessment of the different elements that influence the access to insulin and care for people with diabetes in a given country.

The RAPIA is divided into 3 components:

- Macro – aimed at the Ministerial levels, Private Sector, National Diabetes Association, Central Medical Store and Educators
- Meso – Provincial Health Officers, "Health Care Settings" (Hospitals, Clinics, Health Centres, etc.) and Pharmacies/Dispensaries
- Micro – Carers (Healthcare Workers and Traditional Healers) and people with diabetes.

The RAPIA provides information in the categories of:

- Health service structure and functioning with regards to procurement of medicines, diabetes management
- Diabetes policies written and enacted
- Reported and observed practice for diabetes management
- Availability of insulin, syringes and monitoring equipment
- Existence of distribution networks for insulin
- Insulin supply-related knowledge and attitudes amongst people with diabetes and their carers.
- Other problems that hamper the access to proper insulin and care

The RAPIA is not a statistical assessment of the health system, but has as its aim to assess in a short time the situation with regards to diabetes care in a given country. Its aim is to get a picture of the health system in order to provide different stakeholders involved in diabetes in a given country recommendations for action.

1.7. Mozambique

Mozambique is located on the south-eastern coast of Africa and borders Tanzania to the North, Malawi, Zambia and Zimbabwe to the West, and South Africa and Swaziland to the South. The country is divided into 11 provinces, 3 geographical areas (North, Central and South) and 144 districts. See map of Mozambique in Appendix 1.

The estimated population is almost 22 million individuals with 44.3% aged from 0-14 years, 52.8% from 14-64 and 2.9% 65 and above. Life expectancy at birth is 41.18 years and is extremely low due to a high prevalence of HIV/AIDS (16.1% estimate in 2007). 37% of the population is urban dwelling. (14)

Mozambique's Gross Domestic Product (GDP) at Purchasing Power Parity (PPP) is US\$ 18.95 billion and estimated growth in 2008 was 6.5%. GDP per capita at PPP is estimated to be US\$ 900. (14)

The proportion of the population living below the poverty line in Mozambique has been reduced from 70% in 1997 to less than 60% in 2005. The government has as its aim to have this level at 50% by 2010. (15)

On the United Nation's Development Programme's Human Development Index, Mozambique is ranked 175 out of 179 countries. (16)

1.8. Healthcare in Mozambique

An estimated 25 donors finance about 70% of Mozambique's health budget through basket funding. Some of these donors provide direct financial assistance to MISAU others to specific areas of the country or disease areas. (17)

The WHO estimated that in 2006 Mozambique spent US\$ 56 per person at PPP on health, which represents 4.7% of GDP. (18)

Health services in Mozambique are provided at the primary level by health posts (652) and health centres (435); rural hospitals (27) and district hospitals (8) at the secondary level; general (5) and provincial hospitals (7) at the tertiary level and at the quaternary level by central hospitals (3). This is equivalent to one health unit per 15,000 inhabitants with only 40% of the population having access to these health facilities. (19)

The remainder of the population is covered by: traditional medicine, community health agents, elementary agents and traditional birth attendants. A small part of the population is covered by private healthcare, mainly concentrated in the big cities.

Despite these constraints Mozambique has been able to improve some of its core health indicators. (See Table 1)

Table 1 – Core health indicators 1997-2003

Indicators	1997	2003
Infant Mortality Rate	147/1,000 live births	124/1,000 live births
Mortality Rate < 5 years	219/1,000 live births	178/1,000 live births
Maternal Mortality Rate	690/100,000 live births	408/100,000 live births
Gross Mortality Rate	21.2/1,000 inhabitants	17.2/1,000 inhabitants
Life Expectancy at Birth	42.3 years	46.3 years

In addition some government measures have been implemented that benefit people with chronic illnesses. Decree 16/88 (discount on the total value of the prescription) and the more recent Ministerial Dispatch Nr. 42/2007, (unitary price of 5.00 Mts¹ (five meticaís, US\$ 0.20) per prescription), clearly are measures aimed at benefiting people with chronic diseases. However, this positive measures place a heavy burden on the health system and on the country as the burden of health care costs shift from the individual to the country.

The main health challenges in Mozambique remain Communicable Diseases. HIV/AIDS is now responsible for 1 in 3 deaths (20) and the death rate due to malaria in children under 5 equivalent to 1,159/100,000 population. (21) However, Non Communicable Diseases (NCD) are also increasing in burden. In a recent study by Damasceno et al. (22) a prevalence of 33.1% for hypertension in Mozambique was found, with only 18.4% aware of their condition. About half of those individuals aware of their condition were under treatment and control was found to be extremely low.

NCDs are not only affecting adults, but are also starting to impact children. In a 10 year study of the causes of death of children under the age of 15 years in Manhica, Communicable Diseases are still the most prominent cause of mortality with 73.6%, but NCDs represent 13.4% of the total with 9.5% because of chronic conditions and 3.9% due to injuries. (23)

2. Reassessment using the RAPIA

Mozambique was the first country where the RAPIA was implemented in 2003. Following this the IIF provided technical support and both Diabetes UK and the WDF provided in-country funding for a variety of projects.

One of the outcomes of this support was the development of a National NCD Plan which included as one of its activities to carry out another, follow-up, RAPIA to assess progress with regards to diabetes. The aim of this was to see the progress to date, identify success stories and failures and use these as lessons learnt for the implementation of other programmes for diabetes and NCDs.

¹ For the purpose of this report the average exchange rate from 30/07/08 to 30/07/09 was used. US\$ 1.00 = Mts 26.54

With regards to access to medicines, the initial implementation of the RAPIA only looked at the issue of insulin supply and cost, for this assessment oral medicines for diabetes were also included.

In 2009 the RAPIA was implemented in the City of Maputo, Beira, Lichinga and Xai-Xai. A total of 184 interviews were carried out. These are detailed in the table below.

Table 2 – Number of interviews carried out during the RAPIA

	Maputo	Beira	Lichinga	Gaza	Total
MACRO	9				9
MESO	30	18	11	12	71
MICRO	63	22	12	7	104
	102	40	23	19	184

Each interview had as its main aim to obtain the person's perspective on the problems faced by people with diabetes in Mozambique in gaining access to insulin and proper diabetes care, rather than seeking precise statistical information. The interviews were carried out by the IIF's Project Coordinator and a team of trained interviewers.

Certain documents such as past reports and publications of the Ministry of Health were also reviewed.

3. Diabetes in Mozambique

Data from a population based study in 2005 found a prevalence of diabetes in the Mozambican population aged 25 to 64 years of age was 3.8%. (24) This would mean that there would be a total of 271,088 people with Type 2 diabetes in Mozambique.

This same study found that the prevalence of overweight individuals was 30.1% and 10.2% for urban and rural areas respectively. Obesity rates, one of the main risk factors for Type 2 diabetes, of 11.5% in urban areas and of 2.6% in rural areas was found.

Estimates from the IDF show a prevalence of diabetes in 2003 of 3.1% with a projected increase to 3.6% in 2025. (6)

In Mozambique the IDF estimates that there are 500 prevalent cases of Type 1 diabetes in children aged from 0-14. (6)

Data on duration of diabetes from the people with diabetes interviewed during the RAPIA is detailed in the table below.

Table 3 – Data on duration of diabetes for people with diabetes interviewed during the RAPIA

Time with diabetes (years)	Type 1 diabetes	Type 2 diabetes	Overall
Maximum	25	25	25
Minimum	Newly diagnosed	Newly diagnosed	Newly diagnosed
Average	6.1	5.1	5.4
Median	4.5	3.0	3.5

The table below shows estimates for Type 1 diabetes in Mozambique using data collected during the RAPIA.

Table 4 – Data on estimated prevalence of Type 1 diabetes in Mozambique

Area/data source	People with Type 1 diabetes			Prevalence per 100,000 population	
	Total	0-14 years of age	15+ years of age	0-14 years of age	15+ years of age
National (IDF 2006)	500	500	-	5.6	-
National (RAPIA 2003)	680	122	558	1.6	5.6
National (RAPIA 2009)	674	339	335	2.9	2.5
Maputo	162	96	66	19.8	10.8
Beira	14	5	9	2.6	3.7
Lichinga	3	2	1	4.8	1.9
Xai-Xai	3	1	2	1.2	1.9

Data sources and assumptions:

- Data on numbers from registers in main facilities or statistics from key opinion leaders in each area
- Use of population data for only city where hospital is located even though referral centre for province or even whole country
- Census data from 2003 on population distribution 43.9% 0-14 years of age (25)
- Calculation of National data – equals average of prevalence outside Maputo (for 2003: Lichinga and Beira, for 2009: Beira, Lichinga and Xai-Xai) for whole country population excluding Maputo City where actual prevalence is used

In looking at Table 4 it is clear that Type 1 diabetes is more common in Maputo. This can partly be explained by the fact that Maputo Central Hospital as well as AMODIA, where this data is taken from can be viewed as the national referral centre for diabetes, but mainly because the facilities in Maputo are better equipped than in other areas of the country.

Table 5 compares the numbers of people with Type 1 diabetes present assuming the same prevalence as in Maputo.

Table 5 – Comparison applying Maputo prevalence to all other areas studied

Area	Number of people with Type 1 diabetes assuming same prevalence as Maputo			Actual total number (Table 4)	Proportion present
	Total	0-14 years of age	15+ years of age		
National	3,008	1,774	1,233	674	22%
Beira	86	38	48	14	16%
Lichinga	19	8	11	3	16%
Xai-Xai	37	16	21	3	8%

This shows that in comparison to Maputo only a small percentage of total people with Type 1 diabetes are being diagnosed assuming same incidence throughout Mozambique and also that those people counted in the Maputo statistics are not from other areas of the country.

Data on Type 2 diabetes was harder to collect as consultations for Type 2 diabetes are being decentralised, whereas for Type 1 diabetes most patients were concentrated at the Provincial Hospital in Lichinga, Health Centre and Hospital in Xai-Xai, Central Hospital in Beira and at the Central Hospital/AMODIA in Maputo. (See 4.1. Organisation of the Health System) Also with some of the data available it was hard to tell if the numbers were for individuals or consultations.

Using the national prevalence found during Mozambique’s STEPS study (24) overall there should be 261,303 people with Type 2 diabetes in Mozambique. What is clear from data available is that a large proportion of these people are not diagnosed or that many people after being diagnosed are not being followed-up.

In looking at data from a general hospital in Maputo this number of “missing” people can be seen.

Table 6 – Data on diabetes from Mavalane General Hospital, Maputo

	2008 total patients	2008 new patients	2009 (January - June) total patients	2009 (January - June) new patients
Hospital Statistics	335	33	174	35
Prevalence	2.0%		2.1%*	
Incidence		195.8		415.4*

* - assuming same number of people over next 6 months

Using the prevalence of 3.8% and the population aged from 25-64 served by the hospital one would assume that there would be 640 people with Type 2 diabetes meaning that 46% of people with Type 2 diabetes are missing in this health area.

Estimating the overall number of people with Type 2 diabetes was hard due to complicated patient pathways, lack of clear data and registers.

Using data from different sources estimates were calculated detailed in the table below using assumptions described below the table.

Table 7 – Estimates of number of people with Type 2 diabetes in the different areas where the RAPIA was implemented

	Total Population	Population 25-64	Prevalence	Estimated population with diabetes	People with diabetes identified from RAPIA data	Percentage present
Maputo	1,099,102	370,397	3.80%	14,075	3,768	27%
Beira	436,240	147,013	3.80%	5,586	560	10%
Lichinga	95,172	32,073	3.80%	1,219	236	19%
Xai-Xai	188,720	63,599	3.80%	2,417	423	18%
National	20,404,745	6,876,399	3.80%	261,303		

Data collected and amalgamated from registers, laboratory data and pharmacy data. Use of average number of consultations, prescription and laboratory tests as per data collected during RAPIA.

Assumptions:

- Use of population of city versus province even though facilities in large cities and hospitals are referral facilities for province (Beira for Sofala, Lichinga for Niassa and Xai-Xai for Gaza) and for the country (Maputo).
 - o Maputo data:
 - All patients registered at AMODIA
 - Number of consultations from Maputo Central Hospital
 - Statistics from Mavalane and Jose Macamo General Hospitals
 - Average number of patients at health centres visited applied to health centres with chronic consultations
 - o Beira data:
 - Consultation data from Beira Central Hospital
 - Average number of patients at health centres visited applied to health centres with chronic consultations
 - o Lichinga data:
 - Amalgamation of laboratory, pharmacy and discussions with healthcare workers for Lichinga Provincial Hospital
 - Register from City of Lichinga Health Centre
 - o Xai-Xai data:
 - Amalgamation of laboratory, pharmacy and discussions with healthcare workers for Xai-Xai Provincial Hospital
 - Register from City of Xai-Xai Health Centre

Table 8 – Comparative data from and Registries Laboratories and Pharmacies

	RAPIA data registers or statistics	Laboratory data	Glibenclamide (total courses)	Metformin (total courses)	Insulin (total courses)	Total number of people with diabetes according to medicine use
Maputo Central Hospital	2,958	2,453	797	693	758	2,248
Mavalane General Hospital	348	342	91	33	227	351
Jose Macamo General Hospital	102	369	72	56	227	355
Beira Central Hospital	520	430	47	56	350	453
Lichinga Provincial Hospital	144	144	96		24	120
City of Xai-Xai Health Centre	90		91	27		117

Assumptions:

- Laboratory data – 3 blood glucose measurements per year
- Use of only one type of medicine based on average treatment course determined during RAPIA (see Appendix 2)

Notes:

- Statistics from Lichinga Provincial Hospital based on laboratory data
- No blood glucose done during at the City of Xai-Xai Health Centre RAPIA assessment due to unavailability of strips for glucometer, people sent to Hospital laboratory

In looking at Table 8 it is interesting to see that in some cases these data reflect quite similar numbers of people with diabetes.

In addition to this prevalence data other statistics collected show that diabetes despite being a small part of Mozambique's overall disease burden still accounts for significant use of resources. The IDF estimated that in 2007 diabetes cost International US\$ 25,391,000 to US\$ 45,638,000 equivalent to International US\$ 88 per person. This estimated range of expenditure is set to increase to US\$ 36,350,000 to US\$ 65,165,000 by 2025.

At the Central Hospital in Beira diabetes represented 3% of inpatients at the intensive care unit. In the medicine department at the Provincial Hospital in Xai-Xai from April to July 2009 diabetes represented 1.6% and 0.7% of inpatients in the female and male departments respectively with an average length of stay of 11 days. At the Health Centre of the City Lichinga diabetes consultations represented 6% of total consultations.

4. Results

4.1. Organisation of the Health System

Of the 57 people with diabetes interviewed during the RAPIA 91% were diagnosed as having diabetes by a doctor and 44% of these were at Central Hospitals. 25% were diagnosed at other Hospitals (General or Provincial) and 15% were diagnosed at a Health Centre as well as at a Private Clinic. 56% were not referred to another facility after their diagnosis. The reason for going to a health facility was for 32% of people interviewed that they had the classical symptoms of diabetes (polyuria², polydipsia³, polyphagia⁴ and weight loss). Another 32% presented just generally feeling unwell and a further 26% were diagnosed during a routine medical exam.

Some health facilities will charge a 1 Mts (US\$ 0.04) consultation fee or some patients interviewed viewed their 5 Mts (US\$ 0.20) prescription fee as paying for their consultation and medicines. In addition some people attending the AMODIA consultation (Maputo and Beira) saw their membership fees for the association as payment for their diabetes care.

96% of people interviewed attended a specialised diabetes consultation. This was at AMODIA (Maputo or Beira), Hospitals (Central, Maputo and Beira and General in Maputo) and Health Centres (Maputo and Xai-Xai).

On average people with diabetes were attending a consultation 14 times per year. This average was high as people at AMODIA Maputo were able to go to the Association Clinic when they wanted and see a doctor or nurse. The minimum number of consultations per year was 3.

Average transportation cost was 41 Mts (US\$ 1.54, Median of 15 Mts, US\$ 0.57). Transportation costs were highest outside of Maputo.

4.1.1. Maputo

Chronic disease consultations have been developed in 12 healthcare centres in Maputo. Healthcare workers in these centres received special training, and the health facilities were

² Frequent urination

³ Frequent thirst

⁴ Frequent hunger

equipped with the necessary tools to be able to manage people with diabetes effectively. These consultations were held once a week specifically for people with chronic conditions. However, since this initial training and equipping some facilities no longer provide these consultations as the initial healthcare worker responsible for this is no longer present. Several health centres have close relationships with General Hospitals with some of their patients going to these hospitals for testing or their medicines.

At the General Hospitals in Maputo one is running specific chronic consultations 3 times per week and another is currently being rehabilitated and after this will organise chronic consultations. Some referrals are made from General Hospitals to the Central Hospital for specific testing and complications.

People with diabetes at Maputo Central Hospital should be referred back to their health centre or a General Hospital. However this does not happen as people view care at the Hospital as being of better quality. The outpatient consultation is held once a week in combination with other endocrine disorders. Many patients once they are stabilised at the Hospital will be referred to AMODIA as there is a close link between these facilities. Also some patients will visit both the AMODIA and Central Hospital consultation and mainly go to the AMODIA consultation for education (see 4.1.5. Role of AMODIA).

Specifically with regards to Type 1 diabetes, all people with Type 1 diabetes will be cared for at Maputo Central Hospital and/or AMODIA. A few may be followed at General Hospitals or Health Centres, but this is quite rare. Children once they are stabilised in the Paediatric Department will be sent to the adult consultation and then managed between this consultation and AMODIA.

The pathway of people with Type 1 and Type 2 diabetes in Maputo is described in the diagrams below.

Figure 1 – Pathway of people with Type 1 diabetes in Maputo

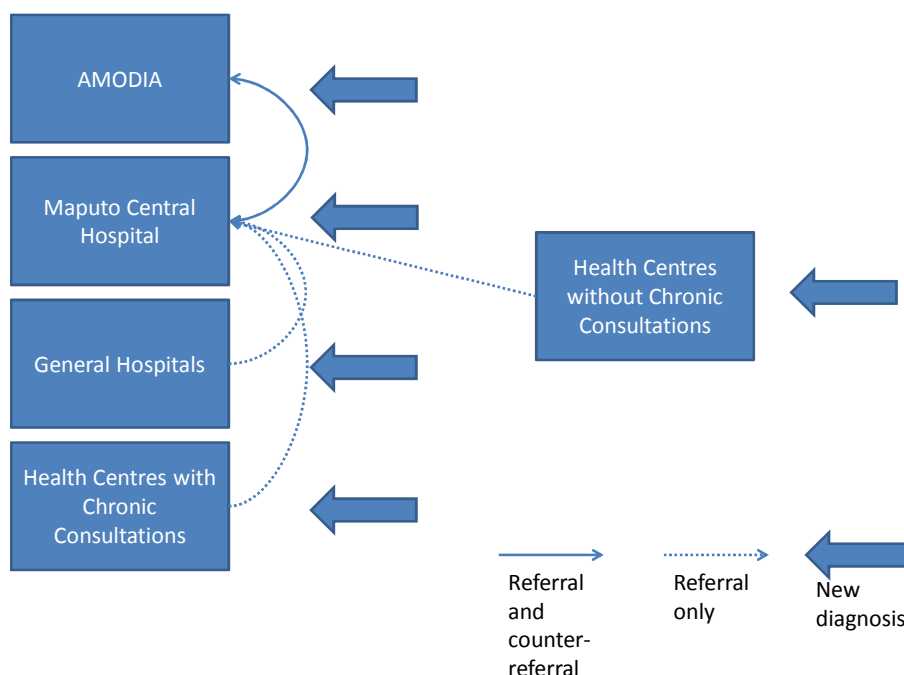
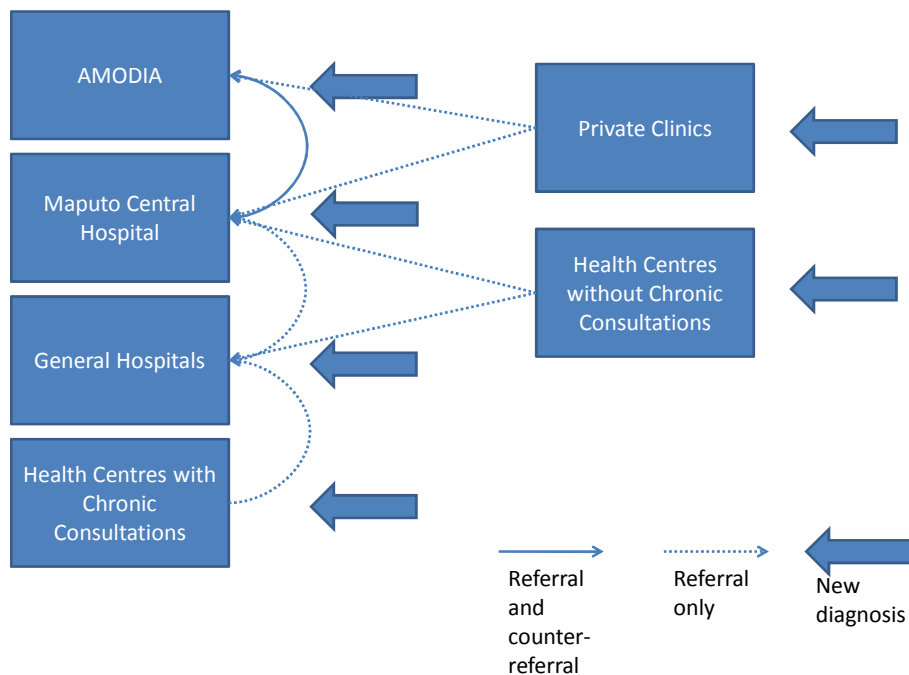


Figure 2 – Pathway of people with Type 2 diabetes in Maputo



4.1.2. Beira

In Beira the main location for diabetes care is at Beira Central Hospital. Two doctors run a weekly consultation. One doctor is an expatriate and the other is junior doctor who needs to divide his time between the diabetes consultation and inpatients.

A diabetes consultation is also held at the Catholic University.

Some health centres see patients with diabetes, but this is done based on staff interest and knowledge and within general medicine consultations.

All patients with Type 1 diabetes will be managed at Beira Central Hospital or the Catholic University. There is no clear link between the paediatric department and the adult diabetes outpatient consultation.

There is no referral back to health centres or facilities closer to the patient’s home.

Figure 3 – Pathway of people with Type 1 diabetes in Beira

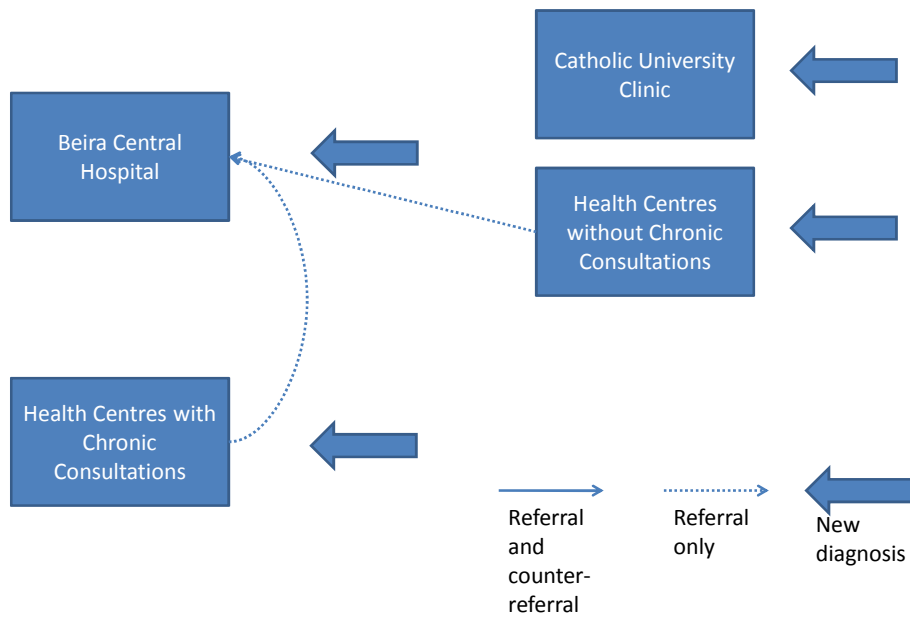
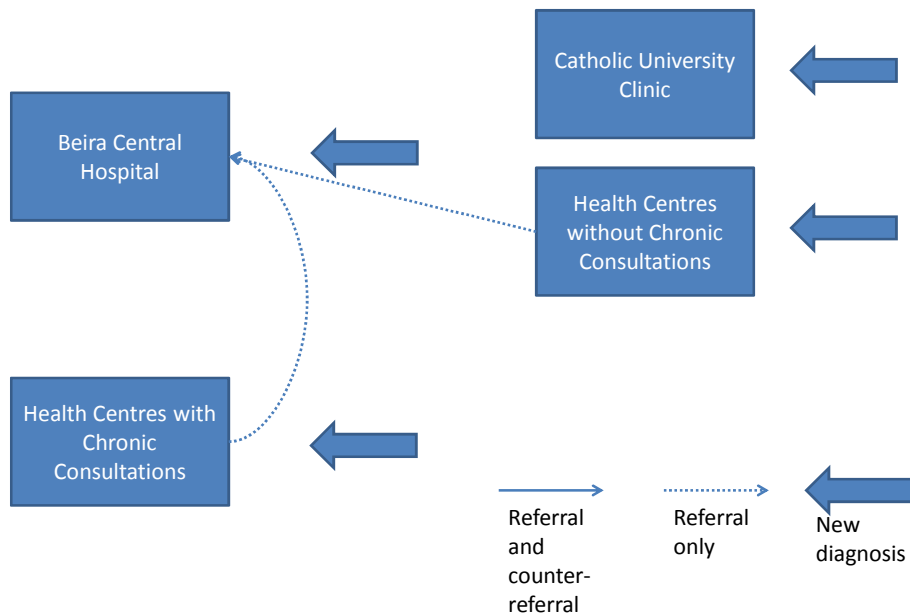


Figure 4 – Pathway of people with Type 2 diabetes in Beira



4.1.3. Lichinga

The Lichinga City Health Centre sees people with diabetes in its general consultations. Patients will either be seen by a doctor or health technician. Both of these health professionals also work at the Lichinga Provincial Hospital leading to close relationships between the health centre and hospital. At the hospital each doctor works in isolation with no clear follow-up of patients or

referral back to health centres. There is no formal referral back to health centres in the community or the City of Lichinga Health Centre. Referrals back to the City of Lichinga Health Centre will be informal or patients seeking the doctor or technician on a specific day at a specific facility.

Health centres in the community and Province will not only send patients to the Provincial Hospital, but also the City of Lichinga Health Centre.

All people with Type 1 diabetes will be seen at the Hospital.

Figure 5 – Pathway of people with Type 1 diabetes in Lichinga

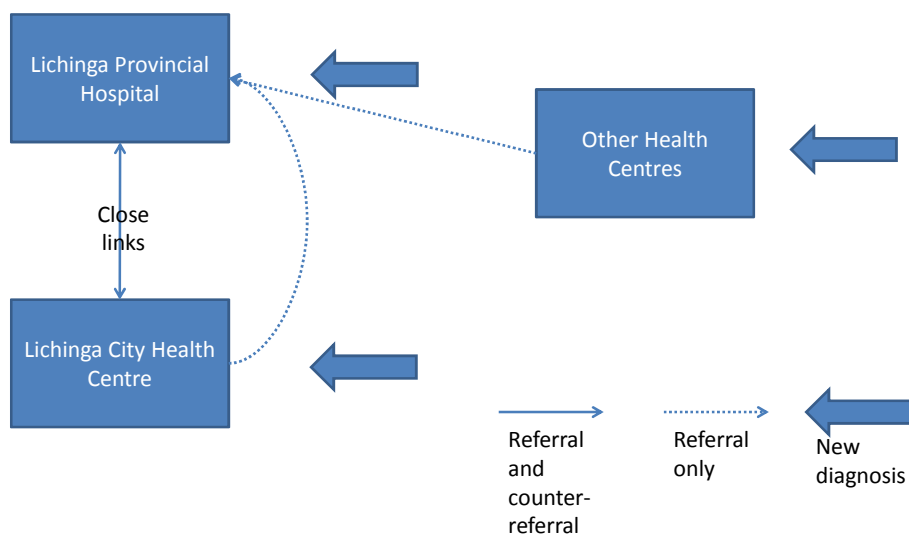
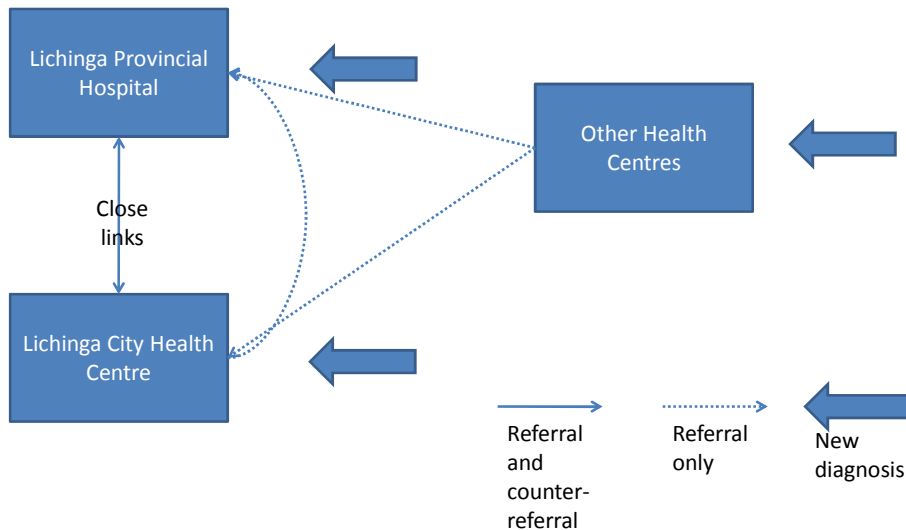


Figure 6 – Pathway of people with Type 2 diabetes in Lichinga



4.1.4. Xai-Xai

Unlike in Lichinga, there is no close collaboration between the Provincial Hospital and main health centre in the city of Xai-Xai. There is no real organisation of diabetes care at the hospital. There was a chronic consultation at the Xai-Xai City Health Centre, but now people with diabetes mixed with all other patients.

Unlike in other hospitals the staff at Xai-Xai Provincial Hospital actively tries to send people with diabetes back to their health centre.

This means that people with Type 1 diabetes are sent back to a health centre, most likely the Xai-Xai City Health Centre for management.

Figure 7 – Pathway of people with Type 1 diabetes in Xai-Xai

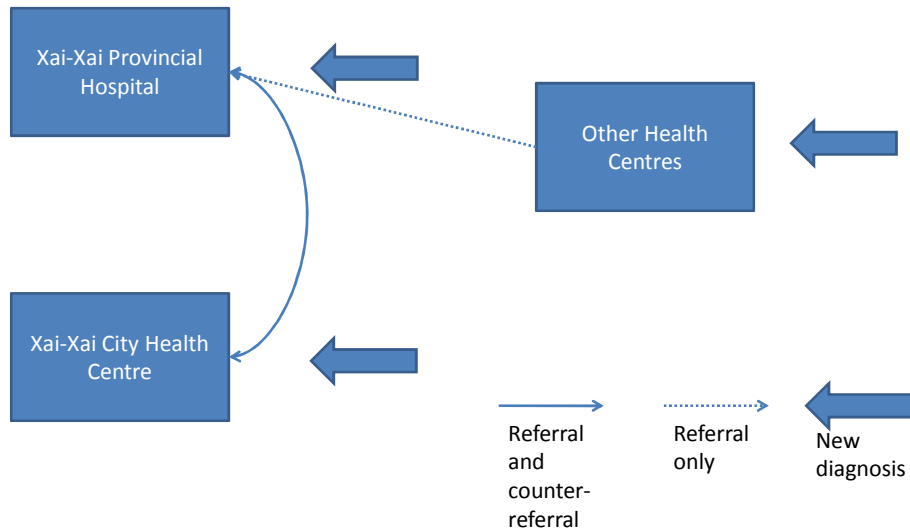
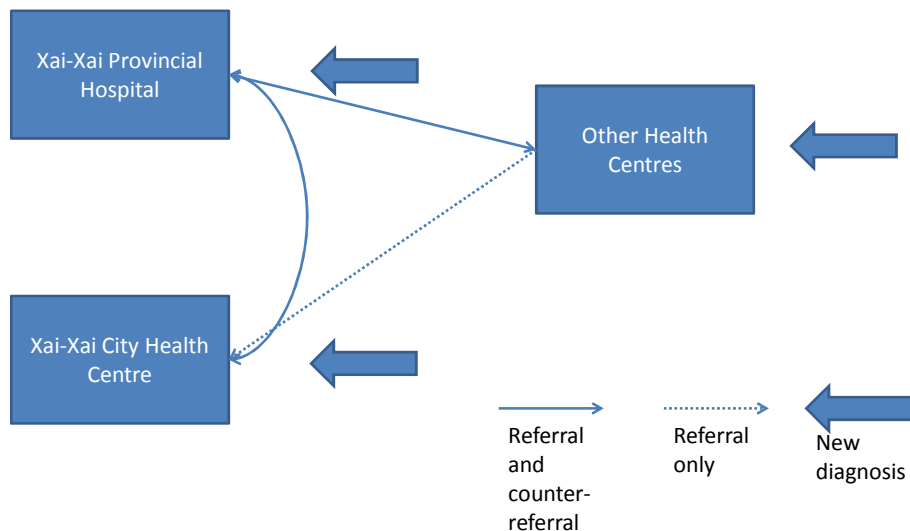


Figure 8 – Pathway of people with Type 2 diabetes in Xai-Xai



4.1.5. Role of AMODIA Maputo

AMODIA Maputo is now known in Maputo through word of mouth and its activities in the community. This means that once diagnosed with diabetes at any level of the health system people will seek their diabetes care at AMODIA. The diabetes consultation that is held within

AMODIA now attracts a vast range of patients from many different socio-economic backgrounds.

There is good collaboration between Maputo Central Hospital and AMODIA with patients from Maputo Central Hospital being sent to AMODIA for care and education. A consultation by a doctor which is held every day of the week sees about 10 patients per consultation. Two nurses work at AMODIA with one nurse present every day providing a consultation to as many people as possible every day. This nurse is assisted by another nurse who is responsible for renewing prescriptions. This consultation is now becoming overburdened.

In parallel to the care people having their consultation at AMODIA will also receive education and support from other members.

There is a membership fee at AMODIA. Even though this is not a payment for care some members viewed this payment of membership fees as a payment for care. This was also the case in Beira with AMODIA Beira.

4.2. Data Collection

Data collection has improved with regards to NCDs and diabetes. The implementation of the WHO STEPS methodology and RAPIA enabled baseline data to be collected. At all levels patient files and clinical registers could be found. Some monthly patient data at facility and provincial levels on NCDs and diabetes was available in different institutions.

In some cases it was hard to determine whether numbers in reported data were individual patients or consultations. Some of this data was used in “Section 3. Diabetes in Mozambique” and further data can be found in Appendix 3.

Problems identified with data were if the numbers detailed in statistics were actual cases of people with diabetes or the total number of diabetes consultations. The other main problem was the use of this data in decision making and planning. This is mainly because data was not collected for this purpose or if it is collected it is done so more as it is a requirement to do so and not used.

Also the flow of data from facility to province and then to the central level has many faults in it. These problems exist at each level and are mainly linked to knowledge of how the data collected will help inform future activities and planning.

4.3. Prevention

Since 2004 World Diabetes Day (WDD) events have been organised in different areas of the country. These activities have included measuring weight and height to collect Body Mass Index (BMI), blood glucose, blood pressure as well as education and information about diet and physical exercise. Some stated that these activities have helped in raising awareness of diabetes at different levels of the health system. One concrete result of WDD 2007 activities was 34 new members joined AMODIA Maputo in the 2 weeks following WDD (normally 5-6 new members monthly) and number of people coming in to get blood glucose measured doubled in Maputo during the same period.

As part of the National Plan on NCDs disease specific days will no longer be promoted. Instead integrated “healthy lifestyle” events will be organised focusing. 4 of these events have already been organised in 2009 and it is planned to have one in each Province by the end of the year. In Maputo AMODIA plays an active role in assisting MISAU in organising these events.

No precise data on complications is present in Mozambique, but Neuropathy was mentioned as the most common complication. Few tools are present for the proper diagnosis and management of this and other complications. Another problem is the lack of patient education, mainly due to time of the healthcare worker.

4.4. Diagnostic tools and infrastructure

MISAU has pushed for improvements in the diagnostic tools available in hospitals, and diabetes “tool kits” have been developed and distributed to health facilities.

In the public sector all laboratory tests are provided for free. At AMODIA Maputo 35 Mts (US\$ 1.32) are paid for non-members to carry-out a blood glucose measurement using a glucometer (this fee also includes measurement of weight and blood pressure). For members these measurements are free. At AMODIA Beira 50 Mts (US\$ 1.88) are paid for a blood glucose measurement with a glucometer and 20 Mts (US\$ 0.75) with a visual blood test strip.

The table below details the availability of different means to diagnose and measure glucose in urine or blood at the facilities visited during the RAPIA assessment.

Table 9 – Availability of testing equipment at facilities visited during the RAPIA

	Biochemistry	Urine strips (glucose and ketones)	Glucometer present	Glucometer present with strips
Availability at facility visited	77%	73%	87%	27%

The main difficulty found was with strips for glucometers and their availability. This is because of the variety of machines available and the unreliable supply of strips for some brands. Some glucometers were purchased centrally by MISAU others by individual facilities, but strips for these were often not available locally either in the specific region where the facility was located or in Mozambique as a whole.

Table 10 – Data collected from laboratory register at Lichinga Provincial Hospital for the month of July 2009

Blood Glucose tests as a %age of total laboratory tests	33%
Total number of Blood Glucose Measurements	213
Total FBG (as noted in register)	136
Total RBG (as noted in register)	77
Average (overall) mmol/l	7.6
Average (FBG) mmol/l	7.5
Average (RBG) mmol/l	7.8
FBG above 7 mmol/l	43
RBG above 11.1 mmol/l	12
All measurements above 7 mmol/l	72
All measurements above 11.1 mmol/l	24
IGT assuming FBG correct	61
IGT using all measurements	100

FBG – Fasting Blood Glucose

RBG – Random Blood Glucose

IGT – Impaired Glucose Tolerance⁵

What this data shows is that blood glucose measurements account for a sizeable proportion of total tests. This data from the laboratory was only used by the hospital administration for the purpose of ordering reagents and not in estimating the burden of diabetes, prevention for those who may have IGT, etc. This issue is linked to the use of data for decision making described in “Section 4.2. Data Collection”. Further detail of the results of this data can be seen in Appendix 4.

All urine strips in health units surveyed were multi-test strips which included glucose, ketones and other measures.

HbA1c was only available at the Central Hospital in Maputo as were diagnostic tools for complications. In some facilities the knowledge of Type 1 diabetes and Diabetic Ketoacidosis has increased, but tools available to manage children were not available when they are admitted.

Only 7% of patients interviewed had their own glucometer as these machines are still expensive for individuals, but the main problem, as for the health system was availability and affordability of strips. In the private sector the cost per strip was on average 15.70 Mts (US\$ 0.59) with the actual meters costing on average 2,783 Mts (US\$ 104.86).

In some laboratories, for example at the Central Hospital in Maputo, the laboratory is divided into different areas, microbiology, haematology and biochemistry. This means multiple samples with problems getting all the results and all the results at the same time.

⁵ Impaired Glucose Tolerance (IGT) is considered to be a “prediabetic” state where glucose levels are higher than normal in association to insulin resistance. IGT may be present many years before diabetes is.

It is planned that all doctors in Mozambique will be supplied with their own glucometer, sphygmomanometer and stethoscope and a tender is being prepared for this.

4.5. Drug procurement and supply

In the latest version of the National Formulary from 2007 the following medicines for diabetes are listed:

- Glibenclamide 5mg
- Glicazide 80mg
- Metformin 500mg
- Repaglanide 1mg
- Rosiglitazone 1mg
- Insulin
 - Rapid
 - Ultra Rapid
 - Intermediate NPH
 - Intermediate bi-phasic
 - Long acting Zinc
 - Long-acting glargine

The types of insulin purchased by the Central de Medicamentos and Artigos Medicos (CMAM) are Actrapid, Actraphane (Mixed 30/70) and Protaphane (Long acting) insulin. All these types of insulin are purchased from Novo Nordisk at a price of US\$ 4.5 per vial. In the 12 months from August 2008 to July 2009 a total of 60,400 vials of insulin were purchased of which 12,400 were Actrapid, 22,000 Mixed and 26,000 Intermediate. Total expenditure on insulin was equivalent to US\$ 271,800 for 18 months. Insulin is bought by tenders with the only supplier being Novo Nordisk.

In looking at Table 11 the distribution of insulin in it is clear that insulin is not distributed equally throughout Mozambique.

Table 11 – Distribution of insulin for 18 months (January 2008 – July 2009) per province

	Actrapid	Protophane	Actraphane	Total vials	% age of total	Total Population	% age of total population
Cabo Delgado	600	850	400	1,850	5.4%	1,632,809	8.0%
Gaza	220	500		720	2.1%	1,219,013	6.0%
Inhambane	320	150	120	590	1.7%	1,267,035	6.2%
Manica	760	1,390	100	2,250	6.5%	1,418,927	7.0%
Central Hospital Maputo	3,360	9,595	250	13,205	38.2%		
General Hospital Jose Macamo	1,100	1,080		2,180	6.3%		
General Hospital Mavalane	100	150		250	0.7%		
General Hospital Zimpeto	50			50	0.1%		
Military Hospital	20	20		40	0.1%		
Total Maputo	4,630	10,845	250	15,725	45.5%	1,259,713	6.2%
Central Hospital Nampula	1,300	500		1,800	5.2%		
Nampula	200	300		500	1.4%		
Total Nampula	1,500	800	0	2,300	6.7%	4,076,642	20.0%
Niassa	100	50	50	200	0.6%	1,178,117	5.8%
Beira Central Hospital	3,330	5,700	480	9,510	27.5%		
Sofala	10	200		210	0.6%		
Total Sofala	3,340	5,900	480	9,720	28.1%	1,654,163	8.1%
Tete	20	250	150	420	1.2%	1,832,339	9.0%
Zambezia	300	500		800	2.3%	3,892,854	19.1%
Total	11,790	21,235	1,550	34,575		20,404,745	

Maputo despite representing only 6.2% of the population receives 45.5% of the total quantity of insulin. This may be explained by many people from all of Mozambique seeking care in Maputo for their diabetes. The three Central Hospitals account for 70.9% of total insulin consumption in Mozambique. Overall no problems with the distribution of insulin were noted. Every 3 months facilities express their needs to the CMAM. Historical data is used to determine the future quantities of insulin required which is then bought through tenders. Every year a margin of 15-20% increase for medicines is assumed in determining quantities for the following year. The tender process takes 6-9 months from the preparation of the tender until the time the medicines arrive in Mozambique.

With regards to the cold chain required for insulin no problems were mentioned with the formal cold chain, but many doctors and pharmacists raised the issue of people using insulin being able to keep this cold at home. From the people with diabetes interviewed that used insulin 58% owned a fridge and stored their insulin in this fridge. Others stored their insulin in neighbours' fridges, in clay pots or in holes dug in the ground.

Unequal distribution is also present for oral medicines as highlighted in Table 12 and Table 13.

Table 12 – Distribution of Metformin for 18 months (January 2008 – July 2009) per province

	Number of tablets	% age of total tablets	% age of total population
Cabo Delgado	22,000	2.5%	8.0%
Gaza	115,000	13.2%	6.0%
Inhambane	11,000	1.3%	6.2%
Central Hospital Maputo	460,000	52.9%	0.0%
General Hospital Jose Macamo	50,000	5.8%	0.0%
General Hospital Mavalane	30,000	3.5%	0.0%
Maputo	60,000	6.9%	0.0%
Military Hospital	1,000	0.1%	0.0%
Total Maputo	601,000	69.2%	6.2%
Central Hospital Nampula	20,000	2.3%	0.0%
Nampula	70,000	8.1%	0.0%
Total Nampula	90,000	10.4%	20.0%
Central Hospital Beira	15,000	1.7%	8.1%
Tete	10,000	1.2%	9.0%
Zambezia	5,000	0.6%	19.1%
Total	869,000		

Table 13 – Distribution of Glibenclamide for 18 months (January 2008 – July 2009) per province

	Number of tablets	% age of total tablets	% age of total population
Cabo Delgado	26,000	1.9%	8.0%
Gaza	62,000	4.5%	6.0%
Inhambane	150,000	10.9%	6.2%
Manica	5,000	0.4%	7.0%
Central Hospital Maputo	370,000	26.9%	
General Hospital Chamanculo	64,000	4.7%	
General Hospital Jose Macamo	60,000	4.4%	
General Hospital Mavalane	75,000	5.5%	
General Hospital Zimpeto	5,000	0.4%	
Military Hospital	1,000	0.1%	
<i>Total Maputo</i>	<i>575,000</i>	<i>41.9%</i>	<i>6.2%</i>
Nampula	273,000	19.9%	
Central Hospital Nampula	20,000	1.5%	
<i>Total Nampula</i>	<i>293,000</i>	<i>21.3%</i>	<i>20.0%</i>
Niassa	10,000	0.7%	5.8%
Central Hospital Beira	56,000	4.1%	
Sofala	31,000	2.3%	
<i>Total Sofala</i>	<i>87,000</i>	<i>6.3%</i>	<i>8.1%</i>
Tete	65,000	4.7%	9.0%
Zambezia	100,000	7.3%	19.1%
Total	1,373,000		

Besides unproportional distribution unequal ratios of Glibenclamide to Metformin were also present.

Table 14 – Ratio of Glibenclamide to Metformin

	Glibenclamide (tablets)	Metformin (tablets)	Ratio Glibenclamide : Metformin
Cabo Delgado	26,000	22,000	1.18
Gaza	62,000	115,000	0.54
Inhambane	150,000	11,000	13.64
Central Hospital Maputo	370,000	460,000	0.80
General Hospital Jose Macamo	60,000	50,000	1.20
General Hospital Mavalane	75,000	30,000	2.50
Military Hospital	1,000	1,000	1.00
<i>Total Maputo</i>	<i>575,000</i>	<i>601,000</i>	<i>0.96</i>
Central Hospital Nampula	20,000	20,000	1.00
Nampula	273,000	70,000	3.90
<i>Total Nampula</i>	<i>293,000</i>	<i>90,000</i>	<i>3.26</i>
Central Hospital Beira	56,000	15,000	3.73
Tete	65,000	10,000	6.50
Zambezia	100,000	5,000	20.00
Total	1,373,000	869,000	1.58

Mozambique spent a total of US\$ 2,812,000 on Glibenclamide (1,200,000, 5mg tablets) and Metformin (700,000, 500 mg tablets) for a unit price per tablet of US\$ 0.002 and US\$ 0.004 respectively.

Total expenditure for 18 months on diabetes medicines was equal to US\$ 3,083,800 equivalent to about 5.1-6.2% of total expenditure on medicines (total expenditure on medicines US\$ 50-60 million in 2008).

In addition in 2008 Mozambique purchased 400,000 insulin syringes at a cost of US\$ 4,312.

One problem highlighted at all levels of the supply system was irregular demand for mainly insulin, but also to a lesser extent for oral medicines. Pharmacists in facilities said that prescriptions of insulin were not regular. At the Provincial level managers of the Provincial warehouses stated that requisitions for insulin from facilities was also uneven throughout the year.

The tables below show the average monthly consumption for insulin, Metformin and Glibenclamide for 2008 and 2009 and the changes between the two periods.

Table 15 – Change in average monthly consumption of insulin 2008-2009

Province/Facility	Average monthly consumption (vials)		Change
	2008	2009	
Cabo Delgado	129	50	-61.3%
Central Hospital Nampula	100	100	0.0%
Zambezia	17	100	500.0%
Manica	113	150	33.3%
Inhambane	21	57	172.0%
Tete	17	37	120.0%
Central Hospital Beira	34	1,517	4339.0%
Niassa	34	17	-51.2%
Central Hospital Maputo	429	1,343	213.3%
General Hospital Jose Macamo	15	333	2122.2%
General Hospital Mavalane	13	17	33.3%
<i>Total Maputo</i>	<i>464</i>	<i>1,693</i>	<i>265.1%</i>
Total	1,384	3,753	171.2%

Table 16 – Change in average monthly consumption of Metformin 2008-2009

Province/Facility	Average monthly consumption (vials)		Change
	2008	2009	
Cabo Delgado	1,000	1,667	66.7%
Nampula	3,333	5,000	50.0%
Inhambane	500	833	66.7%
Central Hospital Maputo	21,667	33,333	53.8%
Total	42,833	54,167	26.5%

Table 17 – Change in average monthly consumption of Glibenclamide 2008-2009

Province/Facility	Average monthly consumption (vials)		Change
	2008	2009	
Tete	5,000	833	-83.3%
Central Hospital Beira	1,333	6,667	400.0%
Central Hospital Maputo	22,500	16,667	-25.9%
Total	101,083	26,667	-73.6%

These changes cannot only be attributed to increase in numbers of people requiring these medicines. As diabetes is a chronic disease one would expect a constant or a small increase each year in the quantity of medicines required.

The difference and changes in the quantities can be linked to better training with changes in therapeutic practices, but also that when one medicine is not present the other is used

interchangeably. When Metformin is not present more Glibenclamide is used, and as historical purchases are used this skews the real need for each given medicine. Another factor is not regular orders from facilities. They will order large quantities at one period in time and then no insulin for a long period of time, rather than regular smaller requisitions.

Another reason for this is that sometimes health facilities do not receive the quantity of medicines they ask for. This was not the case for insulin or oral medicines for diabetes. Pharmacists then inflate the required amount they need to ensure they get the quantity they require. This has been improved in some of the main hospitals as more detailed spreadsheets are used for consumption, available stock and required quantities.

All these factors sometimes lead to loss of medicines due to expiry. Another problem with expiry was delivery of medicines with short expiry dates.

4.6. Accessibility and affordability of medicines and care

At all hospitals visited insulin was available at the time of the survey. It was only available at hospitals and not at health centres. Insulin was also available in 21% of private pharmacies visited. Reasons given for low availability in the private sector were low demand highlighting good availability in the public sector.

At Central Hospital in Beira some problems were noted with regards to the availability of insulin over a short period of time. This was explained by doctors at this hospital prescribing many vials of insulin and these not being in line with past consumption and planning by the hospital pharmacy. Reasons for this were prescribing enough insulin for 3 months or more. The quantity has now been limited to 4 vials per prescription.

73% of public facilities visited had Glibenclamide and 53% had Metformin. Only one hospital visited did not have Metformin. 56% of health centres visited had Glibenclamide and 33% Metformin. Both of these medicines were available in 93% of private pharmacies visited.

Based on data from the CMAM all provinces received insulin in the period from January 2008 to July 2009. The provinces of Manica and Niassa did not receive any Metformin from January 2008 to July 2009, but all provinces received Glibenclamide during this same period of time.

Availability of syringes in the public sector was extremely poor with only Maputo Central Hospital dispensing syringes with insulin. One possible reason for this problem is that the supply of medical and surgical equipment is separate to the supply of medicines.

Per prescription 5 single use syringes were dispensed. This number was determined by the Hospital Pharmacy due to low and unreliable supplies. People with diabetes complained about both the quantity and quality of these syringes saying that the needles on these syringes were extremely large. On average people used six single use syringes per month. In the private sector on average a syringe cost 25 Mts (US\$ 0.94, Range 6 Mts, to 40 Mts, US\$ 0.23 to US\$ 1.51 per syringe). 80% of people interviewed (equivalent to all patients in Maputo) were able to get their syringes at the pharmacy at the Central Hospital and paid 1 Mts (US\$ 0.04) or 5 Mts (US\$ 0.20) for their prescription.

In Lichinga no syringes were available in the private or public sector. Besides the one and only private pharmacy in Lichinga not having syringes all other private pharmacies sold insulin

syringes. On average these cost 9.0 Mts (US\$ 0.34) per syringe (range 2 Mts to 30 Mts, US\$ 0.08 to US\$ 1.13). AMODIA Maputo also sells syringes at 5 Mts (US\$ 0.20) per syringe.

All people in Mozambique have access to medicines for a 5 Mts (US\$ 0.20) prescription fee. Despite this both pharmacists in the private sector and people with diabetes said that the choice of going to the private pharmacy was often done as there were long waits at public pharmacies

In the private sector the average prices for the different medicines and syringes are detailed in the table below as is affordability.

	Insulin	Glibenclamide (per 5mg tablet)	Metformin (per 500 mg tablet)	Syringe (per unit)
Average cost Mts (US\$)	328.8 Mts (US\$ 12.39)	0.9 Mts (US\$ 0.03)	1.7 Mts (US\$ 0.06)	9.0 Mts (US\$ 0.34)
Cost per year Mts (US\$)*	2,640.2 Mts (US\$ 99.48)	755.6 Mts (US\$ 28.47)	1551.3 Mts (US\$ 58.45)	648.0 Mts (US\$ 24.42)
Affordability as %age of GDP per capita	13.8%**	3.2%	6.5%	

* - using average treatment course (Appendix 2)

** - combining insulin and syringes

The mark-up in the private sector between the pharmacy's purchasing price and its selling price is 59%.

Very few patients bought insulin in the private sector, but from past purchases or inquiries the average price of insulin from the data collected through the interviews with people with diabetes was 245 Mts (US\$ 9.23).

Saccharine was also available in public and private sectors. It is interesting to note that it was often viewed as an integral part of treatment.

4.7. Healthcare workers

Since 2003 one particular aspect that the Ministry of Health has focused on is training of healthcare workers in both diabetes and hypertension and the establishment of chronic consultations. One aspect that was said to be lacking in this training was more time and also the need to include more practical aspects.

Involvement of Mozambique with IDF AFRO in a number of key regional initiatives, especially the development of treatment guidelines adapted to the sub-Saharan context has assisted in improving training in Mozambique. These guidelines were translated into Portuguese and now serve as the foundation for training courses in Mozambique. 48% of the healthcare workers interviewed during the RAPIA had received a copy of these guidelines. Furthermore, through this close collaboration, two healthcare workers received training in Tanzania on diabetes education.

As at the time of preparing this report healthcare workers in all Provinces in Mozambique have received training in diabetes and hypertension (total of 247). This training has led to the

establishment of specialised chronic consultations in all 3 Central Hospitals, most health centres within Maputo City and the Provincial Hospitals in Gaza and Quelimane.

The issue however is also that many people trained in diabetes were then given different responsibilities or were sent to different provinces and there was no continuity to their knowledge of diabetes or the consultations they had established.

Of the healthcare workers interviewed 65% had received special training in diabetes in addition to their basic medical training. This training was from the courses described above provided by MISAU or further courses that trained healthcare workers then organised in their respective provinces. The province of Gaza and City of Lichinga had such courses organised.

Of all healthcare workers interviewed 60% felt comfortable treating people with Type 1 diabetes and 65% treating Type 2 diabetes.

Diabetes will also be included in the post-graduate specialisation curriculum with all future specialists required to take a week course in diabetes. The first course was held in August 2009. The Ministry of Health is also planning to include training in diabetes for all medical students before they go to the districts after they finish their medical studies.

The main complaint healthcare workers had was that they were overburdened. Only in some special setting were nurses and/or medical technicians actively involved in diabetes care. This was very much dependent on the doctor involved in running the consultation.

4.8. Adherence issues

48% of people with diabetes interviewed said that diet was the hardest part of their treatment. This was reflected in discussions with healthcare workers who also reflected that this was the hardest part of diabetes management. Most of the time it is due to a misunderstanding about what people with diabetes can and cannot eat.

Adherence to care for Type 1 diabetes is most complicated due to balance between diet and insulin dosage. Most information about diet for Type 1 diabetes is not adapted to Type 1 diabetes, as the focus is on Type 2 diabetes and also not to adapted to the reality in Mozambique. Most children with Type 1 diabetes are on two injections a day.

Doctors stated that few of their patients also went to Traditional Healers. From interviews with people with diabetes it was found that 39% used traditional medicine in parallel with their “modern” treatment. The main reasons given for this was that people were often promised a cure for their diabetes.

As stated by one doctor, and echoed by many others, “When patients feel well they disappear”. This was reflected in other discussions and also the irregular supplies that pharmacists said they needed.

In addition many people with Type 2 diabetes also have hypertension, which leads to issues of managing both conditions.

4.9. Patient education and empowerment

10 members of AMODIA have been trained as expert patients. In addition training materials have been finalised and cover the following themes:

- What is diabetes
- Type 1 diabetes
- Type 2 diabetes
- Low blood sugar (Hypoglycaemia)
- High blood sugar (Hyperglycaemia)
- Diet
- Treatment
 - Diet
 - Physical Activity
 - Medicines (oral and insulin)
- Monitoring and control

A guidebook on how to use these materials for facilitators is now finalised and 20 people linked to AMODIA Maputo (people with diabetes and their family members) have received training in July 2009.

Some education is given during the doctor's consultation, but it is questionable whether it is adapted to reality and individualised to the patient's situation, especially with regards to diet.

The main education and support that people with diabetes get is from both AMODIA Maputo and Beira. Education sessions are held once a week at AMODIA Maputo and done on an ad hoc basis in Beira.

In Xai-Xai educators involved in HIV/AIDS have been included in diabetes education. This integration is also incorporated in National NCD Plan to include diabetes and hypertension in counselling services provided for HIV/AIDS.

4.10. Community involvement and diabetes associations

Three branches of AMODIA now exist. AMODIA has a memorandum of understanding with MISAU.

AMODIA Maputo has now become a "one stop clinic" for diabetes care. Even though the membership fee should not be viewed as a payment for care many people viewed it this way in both Maputo and Beira. AMODIA fees per month in Maputo 100 Mts (US\$ 3.77). In Beira different fee schedules are applied depending on member's income. On average annual fees are 480 Mts (US\$ 18.09) per year.

Besides the branches in Maputo and Beira another AMODIA exists in Quelimane. The RAPIA was not carried out in this area.

AMODIA Maputo held its first general assembly in early 2009 and continues to improve its management of diabetes both from a clinical and community aspect. There are about 2,600 members (2,000 at the end of 2008) and there are regularly 20-40 participants in the weekly education sessions run by a Psychologist and trained members of the association. The association has also held information sessions within the community (churches and women's groups) using their training. Members also visit inpatients with diabetes to provide education and moral support. AMODIA also has the advantage that education and support is given by people with diabetes and in local languages when needed.

Through WDD and other community outreach programmes many people will come directly to AMODIA for a random blood glucose test and be diagnosed at AMODIA. People come to AMODIA from all of Maputo and even Mozambique, but do not want to go back to their health facility due to quality of care and support.

In Beira the main challenge remains a lack of leadership and concrete activities that show a clear benefit to people with diabetes. There is no close interaction between AMODIA and healthcare workers. AMODIA Beira currently has 456 members (as of March 2009), but few of these are paying their membership fees. In discussions with people with diabetes in Beira many said they saw no advantage to being a member of AMODIA as there were no concrete activities. That said many were grateful for the support given and the opportunity to discuss their diabetes with someone who was not a clinician.

During a visit in early 2009 to the AMODIA branch in Quelimane various problems were identified. As the diabetes consultation was shifted from the association to the hospital this caused some problems as members no longer saw the benefit of paying their membership fees. Other activities, such as home visits and education sessions were organised, but in an unstructured manner. Collaboration between the Hospital and Association had suffered due to personality clashes. The Association held a General Assembly on the 16th of May to discuss the future of the Association. There are currently 204 members, which is about the same as the past 2 years.

In all branches of AMODIA the main challenge remains their management capacity and ability to develop their own programmes and projects independently. There is also no link between the different branches of AMODIA.

4.11. Positive policy environment

Many stated that the attention to diabetes had increased at MISAU.

One factor that has contributed to this is the development of the NCD Department within the National Directorate of Public Health. In October 2008 the Minister of Health approved the National Strategic Plan for the Prevention and Control of NCDs. This plan runs from 2008 to 2014 and has as its vision to create a favourable environment that aims to minimise or eliminate the exposure to risk factors and to guarantee access to health care for those who need it. The general objective is to reduce the exposure to NCD risk factors and associated morbidity and mortality with the following strategic objectives: (24)

1. Increase awareness and knowledge about NCDs and their risk factors in Mozambique
2. Improve the quality of and access to preventative and health care services related to NCDs
3. Strengthen and integrate training activities
4. Strengthen and expand the Epidemiological Surveillance System, research, monitoring and evaluation

The specific strategies for the prevention and control for diabetes, which in the National Plan are linked to cardiovascular diseases, are: (24)

1. Primary prevention
 - a. Increase awareness with regards to healthy food and physical exercise
 - b. Education on the risk factors and actual conditions
 - c. Legislation
 - d. Screening for risk factors

2. Secondary
 - a. Early diagnosis and correct treatment
 - b. Patient follow up
 - c. Education of patient and family members
3. Tertiary prevention
 - a. Improve healthcare with the aim to prevent complications, disability and premature death

6 Provincial NCD focal points have been nominated and are working to improve the management of NCDs in their Province by acting as implementers of the National NCD Plan locally.

In addition to this NCDs were included in two key government documents. NCDs are mentioned in Mozambique's "Plano de Acção para a Recução da Pobreza Absoluta II" (PARPA, Poverty Reduction Plan) in that their burden is increasing and that Mozambique is facing a double burden of diseases. (19) The Plano Económico e Social (Economic and Social Plan) of MISAU also includes NCDs and the activities that have been carried out with regards to all NCDs and diabetes. (26) This document is the annual plan for MISAU based on the PARPA and sets the activities for the different areas of MISAU.

Despite this increase in attention resources available did not match the challenge of NCDs in Mozambique. The budget for 2010 for the NCD Department at MISAU is planned at US\$ 97,000 up from about US\$ 73,000 for 2009. The whole budget is provided by the government budget as no donors contribute to NCDs in any way. This amount represents about 2.2% of the total budget for the National Directorate of Public Health.

Knowledge of plan and NCDs is high with those at central level and people involved in trainings and other aspects. In those not involved there is no knowledge of the existence of a National Plan on NCDs.

5. Changes from 2003 to 2009

This section highlights the changes observed from 2003 to 2009 using the framework of the Diabetes Foundation Report on implementing national diabetes programmes and its 11 points: (1) More detailed information on the situation of diabetes in Mozambique in 2003 can be found the IIF's original report (27) and in a publication comparing the results from the RAPIA in Mozambique to those in Zambia (10).

Following the initial implementation of the RAPIA the 9 priority recommendations as ranked by local stakeholders were as follows:

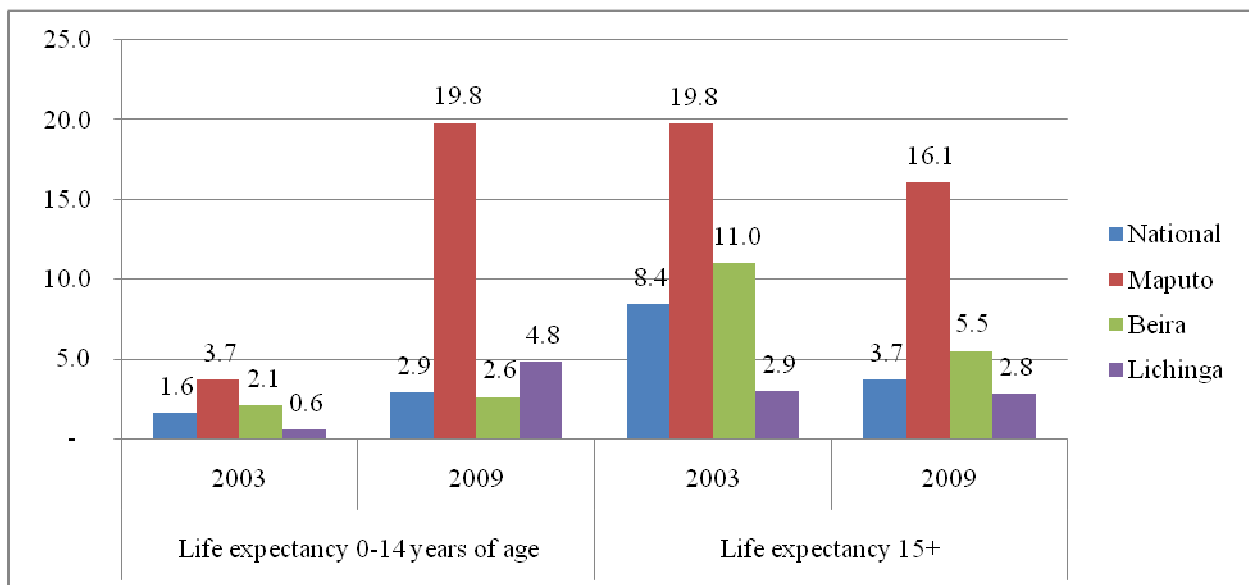
1. Improve AMODIA
2. Implement Chronic Disease Law (80% subsidy on medicines)
3. Improve data collection
4. Increase training
5. Improve communication between central medical store and periphery
6. Increase awareness of diabetes in general public
7. Improve access to diagnostic tools
8. Develop care guidelines
9. Increase number of diabetes consultations

A few factors were highlighted as having enabled such positive developments to take place in Mozambique these were:

- Creation of NCD Department
- Commitment of deciders
- Site visits of the Head of the NCD Department with practical recommendations
- Data
 - STEPS
 - Overall vision and numbers
 - Media attention
 - RAPIA
 - Situation of the Health System
 - Life Expectancy of a child with Type 1 diabetes, shocking figure
 - Highlighting of an unknown situation

As discussed by Kessner et al. (28) and Nolte et al. (29) diabetes can be used as a tracer for the effectiveness of health systems. In 2003 life expectancy was found to be extremely low in people with Type 1 diabetes. The improvements in diabetes management in Mozambique have had an impact on this as described in Figure 9.

Figure 9 – Comparison of life expectancy between 2003 and 2009 in Mozambique



What is clear from this graph is the dramatic increase in Maputo of life expectancy of children with diabetes. That said these calculations make many assumptions with regards to where people with Type 1 diabetes seek care, Maputo versus the rest of Mozambique, Incidence (from international estimates) and data collected during the RAPIA. That said the same method of calculation was used for the estimates in 2003.

The decrease in life expectancy in people aged above 15 can be explained through better training and data records and now the differentiation of true Type 1 diabetes in comparison to insulin-requiring. As children with Type 1 diabetes die extremely quickly without insulin and proper care the increase in the national estimated life-expectancy from 1.6 to 2.9 years and in Lichinga from 0.6 to 4.8 demonstrates the improvements in diabetes care as well as the overall system in the period from 2003 to 2009.

5.1. Organisation of the Health System

In 2003 Maputo Central Hospital was the only facility that provided adequate diabetes care. Two General Hospitals in the vicinity of Maputo had the basic tools for diagnosis, but lacked the staff and insulin so referred their patients to the Central Hospital. No care was provided at health centres. In 2009 Maputo Central Hospital is still the main referral facility for diabetes with AMODIA Maputo, but General Hospitals and even health centres now provide diabetes care.

The situation in Beira between 2003 and 2009 has also improved. In 2003 diabetes care was also provided mainly by an expatriate doctor. This is the case again in 2009, but a local doctor has been involved to a certain extent.

In Lichinga the change has been the most dramatic as in 2003 there was no specialised care for people with diabetes with a serious lack of staff and training. This meant that patients needed to travel to Nampula or even Maputo to receive adequate care. Care in Lichinga is now provided at the Hospital and City Health Centre. Some weaknesses exist, but at least care is now provided, albeit in an uncoordinated manner.

“Besides the care received at Hospitals, AMODIA [Maputo] provides some very basic services only in Maputo. AMODIA is still in its early stages of development. It is funded by donations and a small profit from the sale of medicines, has 124 active members (all of whom are patients) and four people working for it on a regular basis (1 Nurse (paid), and 3 Administrators (1 paid, 2 volunteers)).” (27) Since 2003 AMODIA has become the leading facility for providing diabetes care in Maputo, even receiving people for other areas of the country. In addition to its services knowledge of the existence of a diabetes association has increased with healthcare workers even sending their patients to AMODIA, whereas in the past the association was unknown.

Despite these improvements care is still dependent on where people live, with Maputo providing the best care available. Patient pathways remain complicated as detailed in “Section 4.1. Organisation of the Health System”.

5.2. Data Collection

Patient files and registers were present in 2003, but in most cases they were difficult to use for the purpose of gathering data. The use of these tools has improved greatly.

Now statistics on NCDs have started to be collected at different levels of the health system and the STEPS study and RAPIA added to the data available on diabetes in Mozambique.

5.3. Prevention

Availability of tools, patient education and any awareness raising activity were absent in 2003. Since the initial RAPIA WDD activities have been organised, “healthy lifestyle” events are part of the NCD plan, patient education by AMODIA in Maputo and by healthcare workers has improved.

The remaining weakness is the availability of specialised tools for the detection and management of diabetes related complications.

5.4. Diagnostic tools and infrastructure

Besides the improvements in availability of glucose measuring tools, there has been an overall improvement in presence of tools such as sphygmometers, etc.

In 2003 according to the health care workers interviewed problems with the diagnosis of diabetes was mainly due to a lack of tools such as glucometers and urine test strips. As one health care worker put it “The closer they are [people with diabetes] to a hospital the better they are.” (27) This was due to better knowledge of healthcare workers (clinical signs) and tools.

Both these factors have improved dramatically as shown in Table 18.

Table 18 – Improvement in availability of diagnostic tools in Mozambique from 2003-2009

Item present in %age of health facilities visited	2003	2009
Glucometer	21%	87%
Strips available	6%	27%
Urine testing strips	18%	73%
Biochemistry	11%	77%

Strips for glucometers remain one of the main challenges of the health system.

5.5. Drug procurement and supply

The time taken to prepare tenders, receive medicines and then distribute them throughout Mozambique has decreased from a maximum of 1 year to 9 months.

In the 18 months studied in 2003 115,800 vials of insulin were purchased at a total cost of US\$ 603,824.00. Over the 18 months studied in 2009 34,575 vials were purchased at a total cost of US\$ 271,800.00.

Total expenditure for 18 months on diabetes medicines was equal to US\$ 3,083,800 equivalent to about 5.1-6.2% of total expenditure on medicines (total expenditure on medicines US\$ 50-60 million in 2008). Only for insulin this represented 0.45-0.54% down from 1.73-2.01% in 2003.

In 2003 Mozambique for a period of 18 months paid an average of US\$ 6.86 per vial compared to US\$ 4.50 in 2009 also for an 18 month period.

5.6. Accessibility and affordability of medicines and care

During the implementation of the RAPIA in 2003, it was found that Mozambique’s law on chronic disease, which allows for people with a chronic condition to receive their medication at an 80% discount, was not always implemented. Following the recommendations of IIF, and work by MISAU, this law was fully implemented in 2006; and in 2007, the health minister decreed a US\$ 0.20 prescription fee for all medicines, impacting upon the affordability of insulin and other medications for people with diabetes.

Access to medicines has improved overall. In 2003 only 20% of hospitals visited had insulin in 2009 all hospitals visited had insulin.

Problems existed in 2003 with regards to syringes and persist to a large extent in 2009. In 2003 the price range for syringes was \$0.04 to \$0.20 per syringe. In 2009 this range was US\$ 0.08 to US\$ 1.13.

5.7. Healthcare workers

Importance of training has been recognised and materials have been developed for this and availability of qualified local faculty has facilitated this training with the support of external funding.

In 2003 52% of healthcare workers interviewed said they had received some training in diabetes during their medical education. This was linked to a general lack of awareness of diabetes. Data from the interviews in 2009 show that 65% had received special training in diabetes.

Another issue with regards to training that was mentioned in 2003 was the lack of knowledge of medical students in diabetes, this has started to be addressed with increasing their training. Besides the diabetes specific knowledge, knowledge of how to manage a patient with a chronic illness was also a problem. Some of the training has addressed this, but more is needed.

5.8. Adherence issues

There were three factors impacting adherence in 2003, access to insulin and medicines, knowledge of diabetes (including diet) and continuous care.

Access to medicines was the main concern for people interviewed in 2003. In 2009 48% of people with diabetes interviewed said that diet was the hardest part of their treatment.

Knowledge of diabetes has improved and the chronic nature of diabetes and continuous care needed for it has increased since 2003, but use of traditional medicine and people discontinuing their treatment when they feel well are still problems.

5.9. Patient education and empowerment

Most clinics had no information to hand out to patients or visual aids in 2003. Since then specific materials have been developed, people with diabetes trained in how to teach their colleagues and also inclusion of this aspect in healthcare worker training.

5.10. Community involvement and diabetes associations

In 2003, AMODIA Maputo only had 124 active members and four people working on a regular basis (a paid nurse and three administrators – one paid and two volunteers). The main role of AMODIA at this time was to provide care. AMODIA now has over 2,600 members and has shifted its role from care provider to support network in Maputo.

Also two new branches have been established in Beira and Quelimane since 2003. Also there has been a link developed with external partners for example the IDF, WDF and Diabetes UK that has helped raise the profile of AMODIA and diabetes.

5.11. Positive policy environment

The biggest change between the initial assessment in 2003 and 2009 is that now diabetes is on MISAU's agenda and that NCDs are viewed as a Public Health Problem in Mozambique. This has led to the creation of the NCD Department within MISAU, development of the national plan, a specific budget for NCDs that has been increasing over the years, the inclusion of health promotion activities and the creation of Provincial NCD focal points.

6. Discussion

Overall the health system in Mozambique has improved and this of course will impact the situation of diabetes. A summary table detailing some specific improvements can be found in Appendix 5.

These improvements are also due to activities being based on a clear situation analysis and understanding of the local situation and needs which were developed after the initial RAPIA by close collaboration between MISAU, AMODIA and the IIF with support from the IDF, WDF and Diabetes UK.

The situation analysis and further ranking of the recommendations by local stakeholders created local ownership of the project. These aims overlapped with the objectives of sources of external support with these objectives addressing different aspects of diabetes (e.g. policy, healthcare worker training, patient education, WDD activities, etc.).

All these factors have improved diabetes care and allowed for progress to be made on the 9 priorities identified locally after the 2003 implementation of the RAPIA. These improvements and the interaction between the different aspects are detailed in the figure below.

Figure 10 – Improvements in diabetes in Mozambique – impact of main improvements on the 11 points from the Diabetes Foundation Report on implementing national diabetes programmes (initial phase)

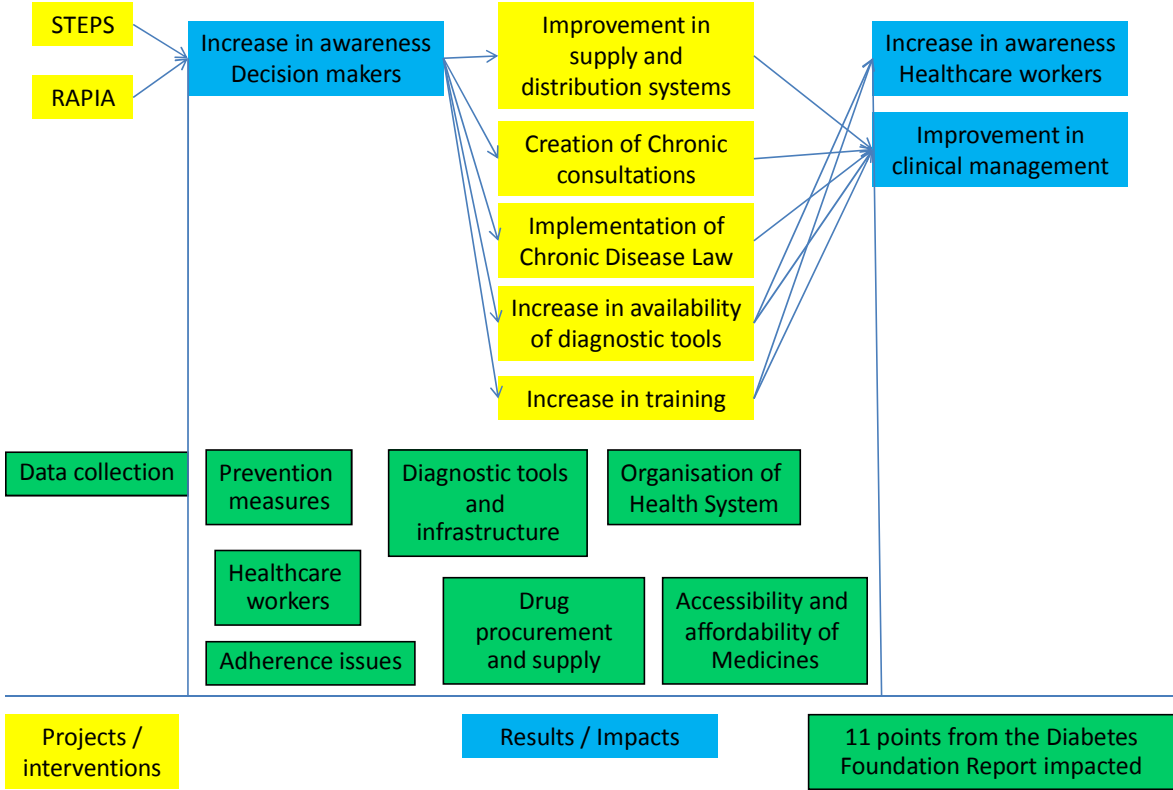
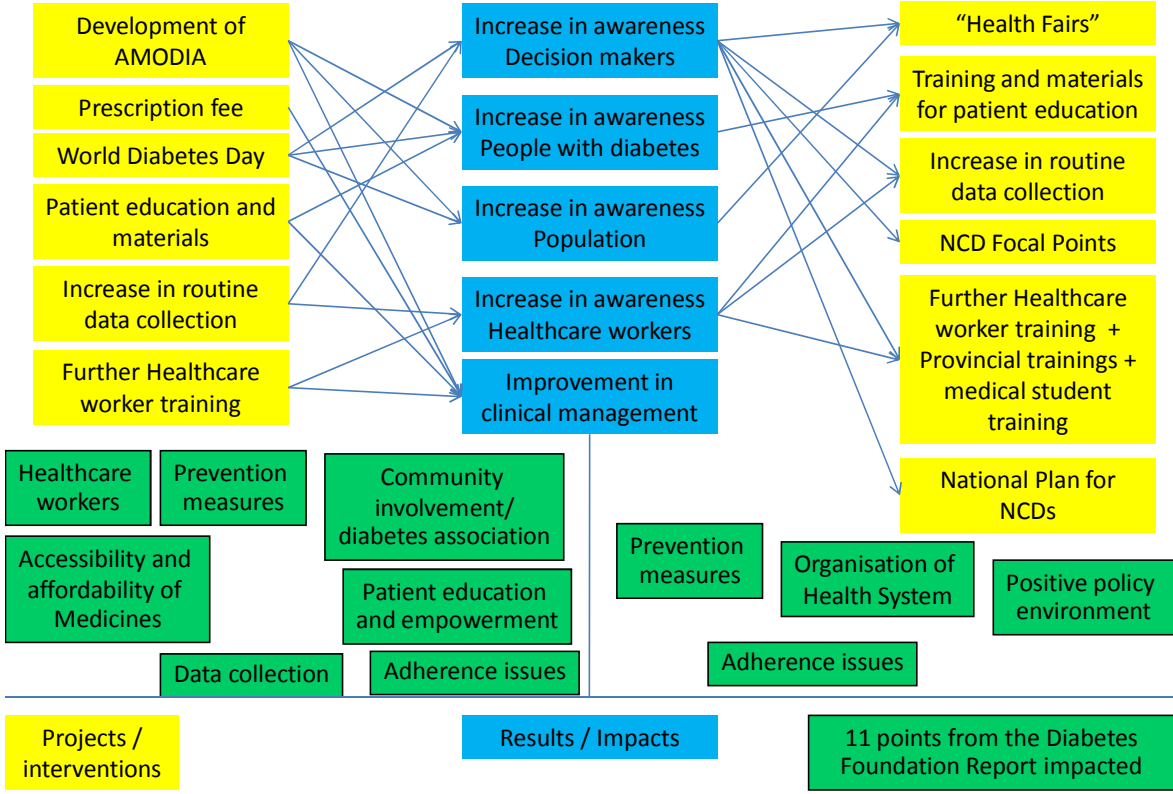


Figure 11 – Improvements in diabetes in Mozambique – impact of main improvements on the 11 points from the Diabetes Foundation Report on implementing national diabetes programmes (second phase)



7. Recommendations

Based on the new assessment and taking into account the project implemented to date the following recommendations aim to address new and continuing issues found with regards to the management of diabetes in Mozambique.

	Finding	Recommendation
1. Organisation of the Health System	<ul style="list-style-type: none"> • Healthcare workers are often trained and provided materials, but then leave facility or area they were trained in 	<ul style="list-style-type: none"> • Ensure continuity of consultation and system and knowledge gained by individuals to create facility knowledge and practice base • Involve nurses and medical technicians
	<ul style="list-style-type: none"> • In some areas there is poor coordination between the hospital and health centre 	<ul style="list-style-type: none"> • Organise interactions, referrals, counter-referrals and roles and responsibilities of hospitals and health centres in the management of diabetes and other NCDs (see specific action plans detailed below) • Strengthen management of diabetes at health facilities
	<ul style="list-style-type: none"> • Low organisation of care at facilities 	
	<ul style="list-style-type: none"> • Lack of clear referral pathways 	
1. Organisation of the Health System and 10. Community involvement and diabetes associations	<ul style="list-style-type: none"> • Low knowledge of AMODIA Maputo and role in diabetes care at MISAU 	<ul style="list-style-type: none"> • Organise visit and presentation of AMODIA activities to Minister of Health
	<ul style="list-style-type: none"> • Unclear roles and responsibilities of different partners in diabetes care, e.g. consultations viewed as AMODIA consultations 	<ul style="list-style-type: none"> • Define roles of AMODIA, clinicians and MISAU through renewing memorandum of understanding detailing the roles and responsibilities of each partner
2. Data Collection	<ul style="list-style-type: none"> • Poor use of data for decision making 	<ul style="list-style-type: none"> • Increase in training for various personnel with regards to the importance of data collection and its use • Dissemination of National NCD Plan • Reporting back to those who collect data
	<ul style="list-style-type: none"> • Data does not always flow from Facility to Province and then Central level 	
3. Prevention and 9. Patient education and empowerment	<ul style="list-style-type: none"> • Problems with patient knowledge still exist especially with regards to nutritional aspects of diabetes management 	<ul style="list-style-type: none"> • Develop adapted materials to local diet • Involve nutritionist in diabetes consultations
4. Diagnostic tools and infrastructure	<ul style="list-style-type: none"> • Problems with availability of strips • Different glucometers available 	<ul style="list-style-type: none"> • Standardisation of glucometers available in public sector • Discussions with private sector on guaranteeing

	Finding	Recommendation
		availability of certain glucometers and strips in Mozambique
	<ul style="list-style-type: none"> •Lack of availability of HbA1c testing at facilities except for Maputo Central Hospital •Lack of tools for complications 	<ul style="list-style-type: none"> •HbA1c at Central and Provincial Hospitals as per National NCD Plan •Development of a “toolkit” for detection of diabetes complications •Training of person responsible for diagnosis and management of diabetes complications initially in each Central Hospital and AMODIA consultation in Maputo, then Provincial Hospitals and so forth
5. Drug procurement and supply	<ul style="list-style-type: none"> •Problems exist with the determination of medicines and the quantities needed •Problems with the availability of syringes except for Maputo Central Hospital 	<ul style="list-style-type: none"> •Involve doctor in determination of medicines •Training and information of people involved in medicine supply about different types of insulin •Investigate applicability of supply system for HIV/AIDS medicines to diabetes • Investigate problem with supply of syringes and see if orders and supply is linked to medicines versus medical equipment
6. Accessibility and affordability of medicines and care	<ul style="list-style-type: none"> •Some people benefit from 1 Mts (US\$ 0.04) prescriptions whereas others need to pay versus 5 Mts (US\$ 0.20) •Saccharine is now available in the public sector 	<ul style="list-style-type: none"> • Clarify regulation <ul style="list-style-type: none"> ○ Applicability of Chronic Disease Law to new regulation of prescription fee • Clear information and guidance sent to Pharmacists • Investigate total cost of this and decide whether this is best use of Mozambique’s resources as it is not an integral part of treatment • Clear explanation to patients that Saccharine is not needed for the proper treatment of diabetes
6. Accessibility and affordability of medicines and care and 10. Community involvement and diabetes	<ul style="list-style-type: none"> •Members of AMODIA view their membership fees as payment for care 	<ul style="list-style-type: none"> • Clarify this issue with AMODIA administrators • Discuss with members of AMODIA • Define roles of AMODIA, clinicians and MISAU through renewing memorandum of understanding detailing the roles and responsibilities of each

	Finding	Recommendation
associations		partner <ul style="list-style-type: none"> Clearly disseminate and discuss with members of AMODIA
7. Healthcare workers	<ul style="list-style-type: none"> Despite improvements and increased numbers of trained healthcare workers some problems remain 	<ul style="list-style-type: none"> Education adapted to each level of the health system and type of healthcare worker Increase on the job training at the Provincial level Increase practical and organisational training <ul style="list-style-type: none"> Not only how to treat diabetes, but also how to organise consultation Training in patient education and management of chronic conditions needs to be increased
8. Adherence issues and 9. Patient education and empowerment	<ul style="list-style-type: none"> Main problems with adherence are misunderstandings about diet and chronic nature of diabetes 	<ul style="list-style-type: none"> Develop materials for patient education Improve healthcare worker training Involve nutritionists in diabetes care Improve training of patient educators on these issues
9. Patient education and empowerment	<ul style="list-style-type: none"> Patient education away from AMODIA is not sufficient 	<ul style="list-style-type: none"> Increase number of trained members of AMODIA Involve AMODIA in patient education in all facilities
10. Community involvement and diabetes associations	<ul style="list-style-type: none"> Weak management capacity 	<ul style="list-style-type: none"> Identify adapted ways of addressing this issue in the different branches of AMODIA Create stronger links between branches
	<ul style="list-style-type: none"> Benefits to people with diabetes at AMODIA not clinical aspect 	<ul style="list-style-type: none"> Increase understanding of what the role of AMODIA is Define roles of AMODIA, clinicians and MISAU through renewing memorandum of understanding detailing the roles and responsibilities of each partner
11. Positive policy environment	<ul style="list-style-type: none"> Lack of knowledge at decision maker level at Provincial and Hospital level of National NCD Plan 	<ul style="list-style-type: none"> Wide dissemination of plan Involvement if NCD focal points

8. Conclusion

The progress made in Mozambique in addressing the growing challenge of diabetes and NCDs should be applauded as the positive developments need to be put into context of a health system where the burden and attention remains linked to communicable diseases and only US\$ 3.00 is spent per person per year on providing healthcare.

Since the first implementation of the RAPIA the foundations of proper management of diabetes have been created. The next phase should focus on fine-tuning and improving the measures implemented to date as well as integrating these with the National NCD Plan. The action plans detailed below build on this as well as the recommendations described above. These are specifically for the areas visited during the 2009 implementation of the RAPIA, but can be applied and adapted to other areas where necessary.

9. Action Plans

9.1. MISAU

The priority for MISAU is to present the National NCD Plan throughout MISAU and then in the Provinces involving the focal points and Hospitals Directors. During this the role and importance of data collection should be highlighted. This presentation should also provide the opportunity to offer a package of training, organisational support and discussion about how to organise diabetes and chronic care within the main city in the province and then throughout the province as a whole. This should help organise interactions, referrals, counter-referrals and roles and responsibilities of hospitals and health centres in the management of diabetes and other NCDs.

The regulation of 1 Mts versus 5 Mts per prescription for people with chronic conditions should be investigated (1 Mts paid after 80% subsidy applied for Chronic conditions). Once a clear position is taken pharmacists and patients should be informed.

In parallel and included in this should be CMAM and Assistencia Medica to see how the medicines and other tools needed for diabetes management should be planned for. This should also include the development of a “toolkit” for detection of diabetes complications.

In collaboration with clinicians and AMODIA the NCD Department in collaboration with the Nutrition Department should develop training and education materials for healthcare workers and patients adapted to the local diet.

In developing close links with AMODIA the roles of AMODIA, clinicians and MISAU need to be clarified and this can be done through renewing memorandum of understanding and detailing the roles and responsibilities of each partner in diabetes care.

Provincial Health Departments

At a provincial level continuity of consultation and system of care and knowledge gained by individuals to create facility knowledge and practice base should be ensured through proper planning. This can be assisted by organising further trainings and involving nurses and medical technicians.

The importance of data collection should be highlighted and also a two-way data flow created from the Province to the Central level and then feedback being given from the Central level.

9.2. CMAM and Assitencia Medica

In collaboration with the NCD Department CMAM and Assitencia Medica should look at ways of standardising glucometers available in public sector. Also with regards to laboratory equipment investigate the feasibility of increasing availability of HbA1c at least at all Central Hospitals and then at Provincial level.

For medicines the applicability of supply system for HIV/AIDS medicines to diabetes should be investigated as well as the total cost of Saccharine and decide whether this is best use of Mozambique's resources as it is not an integral part of treatment.

9.3. Maputo

Maputo Central Hospital and AMODIA

The coordination and collaboration between AMODIA and Maputo Central Hospital works well. AMODIA's consultation may be reaching its limits in terms of capacity. Increase in numbers of healthcare workers at AMODIA may be necessary.

Problems exist with counter-referral, to General Hospitals and Health Centres, due to quality of care at these facilities, but improvements at these facilities should improve this.

Mavalane General Hospital

Mavalane General Hospital has a functioning diabetes and chronic consultation. Training at the hospital and assistance in improving this consultation should be organised including staff from the laboratory and pharmacy. In addition AMODIA Maputo should organise patient education at this hospital in coordination with the management of the hospital.

Jose Macamo General Hospital

The situation at Jose Macamo is slightly different than at Mavalane as there is no organised consultation, but there is a close link with the consultation at Jose Macamo Health Centre. In order to take advantage of the reorganisation of the hospital it is suggested that MISAU facilitates a training course at the hospital linked to technical support on how to organise a chronic consultation including staff from the laboratory and pharmacy. In addition at this training/organisation AMODIA Maputo should be involved in organising patient education.

Health Centres

At some facilities where chronic consultations were developed these are no longer in place as the trained healthcare worker has left. In others these work extremely well. Strengthening of management at this level is needed with more training and also in organising the consultation and referrals. Also patient education needs to be included and AMODIA could play a role in doing this in coordination with the healthcare workers at these facilities.

AMODIA

AMODIA Maputo plays a vital role in diabetes care. As well the model of care, support and education that is provided should be the basis of all chronic consultations. In addition the close collaboration between clinicians and people with diabetes is another model that could be used in other chronic consultations. With this in mind a visit to AMODIA by people from MISAU and other

health facilities would be useful to showcase AMODIA's work as well as build knowledge of its activities.

The main problem with AMODIA is management capacity. This should be addressed locally with the best solution found by for example more active involvement of members, volunteers, etc.

AMODIA has been able to involve a psychologist in its education sessions, the same should be done with a nutritionist. In addition AMODIA's education activities should be take to facilities, such as the General Hospitals in Maputo and Health Centres where there are chronic consultations.

9.4. Beira

Beira Central Hospital

As in 2003 the main person responsible for diabetes care is an expatriate doctor. This needs to be changed with a dedicated doctor(s) for the diabetes consultation.

Health Centres

Unlike in Maputo there are no chronic consultations at Health Centres. This should be developed through a close collaboration between MISAU, Provincial and City Health Authorities, Beira Central Hospital and the Health Centres with training, technical support and organisational aspects being included as well as the inclusion of pharmacists and laboratory technicians.

AMODIA

AMODIA in Beira has the same management problems as Maputo as well as a lack of defined role and link with clinicians at Beira Central Hospital.

Training and an increase in patient education is needed. Following all these elements outreach into the community should be initiated.

9.5. Lichinga

Lichinga Provincial Hospital and City of Lichinga Health Centre

Close collaboration between these facilities exists, but there is no chronic consultation as such with patients "floating" between these two facilities. A clear consultation needs to be established at one of these facilities with the necessary tools, infrastructure and training organised. This can then serve as the basis for the development of diabetes and chronic care throughout the Province.

9.6. Xai-Xai

Xai-Xai Provincial Hospital and City of Xai-Xai Health Centre

In Xai-Xai the difference is that the City of Xai-Xai Health Centre has an organised consultation and links between the Provincial Hospital and Health Centre need to be improved to ensure comprehensive follow-up of people with diabetes.

10. Acknowledgements

This assessment using the RAPIA was possible through the generous support of Diabetes UK to Mozambique through the “Twinning Project”. The pilot of the RAPIA in Mozambique in 2003 was made possible thanks to a grant from the World Diabetes Foundation.

The support of His Excellency the Minister of Health, Prof. Dr. Paulo Ivo Garrido is most gratefully recognised as is the assistance of the following individuals:

- Dr. Americo Asane
- Dr. Paula Caupers
- Professor Aires Fernandes
- Dr. Ermelinda Gomes
- Dr. Marina Karageanes
- Dr. Gilberto Manhiça
- Dr. Mourzinho Saíde
- Dr. Paula Santos
- Dr. Armindo Tiago
- Dr. Adalgisa Viola

Many thanks to the directors and staff of the following institutions and organisations:

- Associação Moçambicana de Diabetes – Beira
- Associação Moçambicana de Diabetes – Maputo
- Central de Medicamentos e Artigos Medicos
- Depostio Provincial de Gaza
- Depostio Provincial de Niassa
- Depostio Provincial de Sofala
- Direcção de Saúde da Cidade de Beira
- Direcção de Saúde da Cidade de Lichinga
- Direcção de Saúde da Cidade de Maputo
- Direcção Provincial de Saúde de Gaza
- Direcção Provincial de Saúde de Niassa
- Direcção Provincial de Saúde de Sofala
- Hospital Central de Beira
- Hospital Central de Maputo
- Hospital José Macamo
- Hospital Mavalane
- Hospital Provincial de Lichinga
- Hospital Provincial de Xai-Xai

as well as all the other individuals who gave of their time.

This report would not have been possible without the hard work and dedication of the RAPIA team:

- Américo Barata
- Alexandre Chavanguane
- Aulinha da Silva
- Fernando Dimande
- Abel Matuque

Much appreciation to the Trustees of the International Insulin Foundation: John Bowis MEP, Dr. Maximilian de Courten, Professor Geoffrey Gill, Professor Harry Keen, Professor Ayesha Motala, Dr. Kaushik Ramaiya, Professor Solomon Tesfaye, Professor Stephen Tomlinson, Professor Nigel Unwin and Professor John S. Yudkin for their continued support and dedication.

Appendices

Appendix 1 – Map of Mozambique



Map taken from: www.cia.gov/library/publications/the-world-factbook/geos/MZ.html

Appendix 2 – Average treatment course from RAPIA data and National Formulary

Average treatment course	RAPIA data (tablets or units per day)	National Formulary (tablets or units per day)
Metformin	2.5	1
Glibenclamide	2.3	2.5
Insulin	22	

Appendix 3 – Examples of data on diabetes and NCDs collected during the RAPIA

- DM – Diabetes
- HTA - Hypertension

Table 19 – Data on admissions at the intensive care unit at Central Hospital Beira 2009

	January	February	March	April	Total 4 months	% age of total
DM	6	5	7	2	20	3%
Death	0	0	0	0	0	0%
HTA	5	2	7	0	14	2%
Death	0	0	0	0	0	0%
Stroke	8	7	6	11	32	5%
Death	2	1	2	3	8	5%

Table 20 – Data on admissions to Medicine Department at Central Hospital Beira 2009

	January	February	March	April	May	Total 5 months	% age of total
DM	0	0	0	0	0	0	0%
Death	0	0	0	0	0	0	0%
HTA	0	0	0	0	49	49	2%
Death	0	0	0	0	7	7	1%
Stroke	21	41	25	30	6	123	4%
Death	3	8	3	5	1	20	2%

Table 21 – Data on inpatients at Provincial Hospital in Xai-Xai April-July 2009

Department	DM	HTA	DM + HTA	Stroke	DM + Stroke	HTA + Stroke
Female	4	21	1	2	1	5
%age of total	1.0%	5.3%	0.3%	0.5%	0.3%	1.3%
Male	2	10	0	1	0	3
%age of total	0.7%	3.3%	0.0%	0.3%	0.0%	1.0%

Table 22 – Data on cases of Non Communicable Diseases from Xai-Xai Province (6 Districts) for 1 month

	DM	HTA	Stroke
Cases for 1 month	93	1,000	7

Table 23 – Data on Non Communicable Disease consultations at City Health Centre in Lichinga

	DM	HTA	DM + HTA	Total
Consultations (July 2008-July 2009)	86	192	6	1,344
Percentage of total	6%	14%	7%	

Appendix 4 – Data on blood glucose measurements from Lichinga Provincial Hospital

Table 24 – Data on blood glucose measurements from Lichinga Provincial Hospital

Blood glucose level mmol/l	<5.0	5.1-7.0	7.1-9.0	9.1-11.0	11.1+
FBG	45	48	15	16	12
RBG	20	28	13	4	12
All	65	76	28	20	24

Appendix 5 – Measures of improvement 2003-2009

Table 25 – Specific indicators showing improvements from 2003-2009

Indicator	2003	2009
<i>Insulin</i>		
18 months insulin expenditure	\$603,824.00	\$271,800.00
Insulin expenditure as %age of total spending on medicines	1.73%	0.54%
Proportion of total amount of insulin in Maputo	77%	46%
Time for tender (maximum)	12 months	9 months
Margin private pharmacy	76%	59%
Average tender price per vial of insulin (18 months)	\$6.86	\$4.50
Insulin always present at %age of hospitals	20%	100%
Average price per vial of insulin to public pharmacies	\$5.66	\$4.50
Average price per vial of insulin to patient (private)	\$8.89	\$12.39
Average price per vial of insulin to patient (public)	\$1.13	\$0.20
<i>Syringes</i>		
Price of syringes public sector	\$0.04	\$0.20*
Price of syringes private sector	\$0.20	\$0.34
<i>Presence of diagnostic tools</i>		
Blood glucose machine	21%	87%
Are consumables available for the Blood glucose machine	6%	27%
Urine testing strips	18%	73%
Presence ketone strips	8%	73%
<i>Healthcare workers</i>		
Number of healthcare workers who have received training in diabetes (2003 basic, 2009 specialised)	52%	65%
<i>Patient numbers and Life Expectancy</i>		
Number of people with Type 1 diabetes - Lichinga	2	3
Number of people with Type 1 diabetes - Beira	20	14
Number of people with Type 1 diabetes - Maputo	181	162
Mozambique National Life Expectancy (0-14)	1.5	2.9
Mozambique National Life Expectancy (15+)	12.3	3.7
Maputo Life Expectancy (0-14)	3.8	19.8
Maputo Life Expectancy (15+)	20	16.1
Beira Life Expectancy (0-14)	2.1	2.6
Beira Life Expectancy (15+)	11.1	5.5
Lichinga Life Expectancy (0-14)	0.6	2.8
Lichinga Life Expectancy (15+)	2.9	2.8

* - included in 5 Mts (US\$0.20) prescription fee

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