

**FINAL REPORT OF THE
INTERNATIONAL INSULIN
FOUNDATION ON THE RAPID
ASSESSMENT PROTOCOL FOR
INSULIN ACCESS IN MALI**

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**Prepared by the International Insulin Foundation in collaboration with Santé
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Mali, the Direction Nationale de la Santé and Dr. A. Nientao.**

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1. Executive Summary

This report, prepared by the International Insulin Foundation (IIF) in collaboration with Santé Diabète Mali (SDM), is to be the first stage in a collaborative process between different national and international stakeholders to find creative means to improve the welfare of people with Type 1 diabetes in Mali. The IIF aims to mobilise different areas of expertise and resources to frame practical proposals to help Mali provide the care that people with Type 1 diabetes require. In parallel this report hopes to contribute positively to the development of a chronic disease policy in Mali.

1.1. Key Findings

All these issues need to be placed in Mali's general health care context where problems of staff, infrastructure and resources are omnipresent.

- Data and Information:
 - No standardised means of collecting information on patients
 - Lack of information on the number of people with diabetes in Mali
- Insulin:
 - Not available to patients at lowest possible price
 - Not available, without disruption, in the public sector
 - High price of insulin for patients
- Materials:
 - Syringes not available in the public sector
 - 5% Value Added Tax (VAT) on syringes
- Diabetes Care:
 - No guidelines or treatment protocols
 - No organisation and coordination of care and referrals
 - Sub-optimal use of existing health pyramid in Mali
 - Long waiting times
 - Lack of patient education
- Diagnosis:
 - Lack of availability of appropriate materials at the appropriate levels of the health system
 - Problems with the supply of reagents and other materials to laboratories
- Healthcare worker education:
 - Lack of basic knowledge of frontline healthcare workers
 - No continued education and training
- Diabetes Association:
 - Lack of a clear definition of its role
 - No organisational structure on a national level
- Other:
 - Better cooperation and coordination needed between all stakeholders (Ministry of Health, WHO, clinicians, Association Malienne de Lutte Contre le Diabète (AMLD), SDM, etc.)
 - Draft policy document on Non Communicable Diseases (NCDs) does not take into account the realities of diabetes outside Bamako
 - Lack of coordination with regards to donations
 - Traditional healers play an important role in provision of care
 - High overall financial burden on patients

1.2. Recommendations

Keeping in mind the resource restrictions present in Mali the following recommendations aim to make best use of limited resources also in order to benefit patients with diabetes as well as other areas of health care in Mali.

- Data and Information:
 - Carry out a basic survey to assess the prevalence of diabetes in Mali
 - Develop a standardised patient information sheet or record keeping system
- Insulin:
 - Develop proper purchasing and distribution mechanisms at the Pharmacie Populaire du Mali (PPM)
 - Explore possibilities for Mali to join the Novo Nordisk LEAD Initiative
 - Registration of generic insulin manufacturer
 - Decision by government to provide insulin for free or at a subsidised cost
- Materials:
 - Add syringes to Essential Drug list
 - Remove 5% VAT on all materials necessary for proper diabetes care
- Diabetes Care:
 - Define the role of each level of the health system in diabetes care for each region
 - Identify focal point for diabetes care in each region
 - Develop guidelines for organisation of diabetes consultations and inclusion of patient education
 - Adapt IDF guidelines to Mali
- Diagnosis:
 - Develop a realistic and sustainable Essential Equipment list for each level of the health system
 - Develop a supply chain for laboratory materials
- Healthcare worker education:
 - Improve basic healthcare worker training to include more on diabetes care and Non Communicable Disease (NCD) management
- Diabetes Association:
 - Diabetes Association to analyse its role in the caring and support of people with diabetes in Mali
 - Organisation AMLD as a national entity
- Other:
 - Establishment of a working group on diabetes in Mali
 - Reorientation of the policy document based on the RAPIA findings
 - Establishment of donation guidelines and control mechanisms
 - Inclusion of traditional healers in diabetes programmes
 - Find novel and sustainable ways to address the financial burden that diabetes puts on the individual and the health system

2. Background Information

2.1. Diabetes

Type 1 diabetes or Insulin Dependent Diabetes Mellitus (IDDM) is a life-long condition, affecting children, young people and adults world-wide. The disease is recognised by a loss of control over the use of the body's glucose and other fuels and due to the destruction of insulin producing cells in the pancreas (pancreatic islet beta cells). Inadequate care leads to serious health complications such as blindness, kidney failure, nerve disease, limb amputation, heart attacks, strokes and premature death.

Insulin is vital for the survival of people suffering from Type 1 diabetes and in some people suffering from Type 2 or Non Insulin Dependent Diabetes Mellitus (NIDDM). However, also of central importance are the means to administer the medication (syringe/needles), the means to monitor the response to insulin (blood/urine tests) and an understanding of how insulin acts and affects life and work of the individual (training of healthcare workers). [For more information](#) regarding insulin and diabetes, please refer to Appendix 2.

2.2. Insulin

~~Insulin is the body's 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 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.~~

2.3. Type 1 diabetes and insulin in developing countries

~~Leonard Thompson, a Canadian child, was given his first injection of insulin on 11 January 1922[Burrow, 1982 #4]. 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 Type 1 diabetic patients in the pre-insulin era.~~

~~The IDF estimates that in Africa there are approximately 108,000 people with Type 1 diabetes. [Federation, 2003 #12] With the restricted availability of insulin, the life expectancy of a child with newly diagnosed Type 1 diabetes in much of sub-Saharan Africa may be as short as one year. Restricted access to insulin also results in debilitating complications such as amputations, blindness and a much reduced life expectancy.~~

~~Restricted access to insulin in sub-Saharan Africa is not only due to lack of availability, but also cost. Chale and McLarty [Chale, 1997 #2] found that the annual direct cost for an insulin requiring patient was equivalent to US\$229 (€ 176, CFA 118,850), with almost 70% of this amount for the purchase of insulin.~~

2.4. Incidence and Prevalence of Diabetes

~~Incidence is the measure of how many people within a certain population will get a disease within a certain time. The incidence of diabetes in children varies greatly from country to country. For Mali the incidence of Type 1 diabetes is estimated by the IDF as 1 per 100,000 each year [Federation, 2003 #12]. This estimate is based on a study by Olatunbosun et al. [Olatunbosun ST, 1998 #9] in Nigeria. With around 4 million children aged under 15 in Mali, this would mean that 40 new cases develop in the country each year.~~

~~The prevalence is the proportion of a population at a given time that has a certain disease. For a lifelong condition like diabetes this will depend, as well as on the incidence, on how long someone with the condition survives after being affected. Before the discovery of insulin the prevalence of Type 1 diabetes was very low, although the incidence may have been high. This is because new cases of diabetes were dying very soon after disease onset, as there was no appropriate treatment for them. In developing countries, the incidence is difficult to assess, as survival may be very short, and many people will die undiagnosed.~~

~~One other factor which comes into play is whether patients developing the disease are diagnosed. In some parts of the developing world, patients with weight loss, fatigue and other symptoms of Type 1 diabetes may be misdiagnosed, for example, with AIDS, or those presenting in diabetic coma as having malaria. This will artificially lower estimates of incidence.~~

~~There is no information on the prevalence of Type 1 diabetes in Mali other than estimates from the IDF based on assumptions regarding incidence and life expectancy.~~

2.25. International Insulin Foundation

The 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 developing 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, may offer 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).

2.3. Rapid Assessment Protocol for Insulin Access (RAPIA) – method of assessment

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 Type 1 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

2.4 Mali

Mali gained its independence in June 1960. After independence Mali merged with Senegal to form a short-lived federation. Modibo Keita became Mali's first president.

In 1962 Mali embarked on a series of disastrous socialist policies that sent the economy into disarray leading Moussa Traoré to take over in a bloodless coup in 1968. Despite several coup attempts Mali remained quite stable during the 1970's and 1980's.

In 1991, a mix of Traoré's handling of Touareg rebels in the North, his repeated refusals to consider political pluralism, and his open-fire policy toward strikers and rioters led Lt.Col Amadou Toumani Touré (ATT) to take control of the country and appoint a civilian, Soumana Sacko, to head a transitional government. From this ATT gained the status of national hero as he had given up power in favour of a democratic process following the coup he staged.

In 1992 multiparty elections were held and Alpha Konaré was elected as President. Konaré was reelected by a landslide in 1997, but could not run for a third term.

In May 2002 ATT came out of retirement to win the presidency, although the result was marred by allegations of irregularities.

Since then ATT even though he is widely respected for his peace efforts and humanitarian work, has had to face two government resignations without explanation October 2002, and again in April 2004.¹

Mali is divided into 8 regions and the Capital District of Bamako and borders Senegal, Guinea, the Ivory Coast, Burkina Faso, Niger, Algeria and Mauritania.

More than half the population in Mali lack access to drinking water and more than three quarters are illiterate. From 1994 onwards 70% of the population are income poor. In 2000 after the adoption of a Poverty Reduction Strategy Paper by the Malian government, 80% of the government's budget was covered by external donors.²

Mali ranks 172 out of 175 on the Human Development Index.³ Life expectancy at birth for the total population is 44.8.⁴ The country's main health problems are :

- Malaria
- Measles
- Tetanus
- Respiratory infections
- Diarrhoea

Adult HIV prevalence was estimated in 2001 at 1.7%. Many people working in the health sector believe that this number underestimates the true rate.

Mali also has a high Infant mortality rate of 141 per 1,000 live births in 2001 and Maternal mortality rate of 580 per 100,000 live births.³

2.5. Mali's healthcare system

Mali's constitution guarantees the right to health. The objective is to have health for all in the nearest future possible.

In 1991 Mali developed a healthcare policy based on community involvement, cost recovery and the availability of essential medicines.⁵

Health policy in Mali is developed by the Ministère de la Santé (Ministry of Health) and implemented by the Direction Nationale de la Santé (National Health Directorate, DNS).

The total health budget in 2003 for Mali was CFA 42,566,216,000 (€64,788,761).⁶ The majority of this budget is financed by multi and bi lateral donors.

Figure 1 – Ministry of Health Structure in Mali



The diagram above shows the structure of the Ministry of Health and the different components that compose both the policy side and executive side of government health structures at a national level.

National policies and plans are elaborated centrally in Bamako and it is the responsibility of each region to adapt these to its local needs. Mali is currently putting a large emphasis on decentralisation and therefore the Regional Health Directorates (DRS) are playing a larger role in the development of regional health programmes.

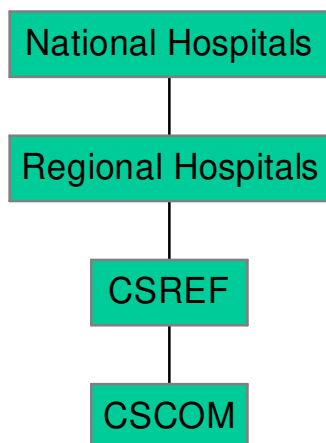
Decentralisation is also impacting the three National Hospitals (Point G, Gabriel Touré and Kati) as they are all being given a larger role in management and decision making with less and less intervention from the central level.

The same is true for the 7 Regional Hospitals. Below the Hospitals are the Centre de Santé de Centre de Santé de Référence (CSREF, Referral Health Centre). These facilities are linked to the DRS and are present in each Cercle (Circle, literal translation, equivalent to a District). These facilities are health centres with in some cases quite advanced facilities. Their role is to act as a link between the Centre de Santé Communautaire (CSCOM, Community Health Centre) and the Hospitals. Each CSREF has a few CSCOM reporting to it. The head of the CSREF has a supervisory role over the CSCOM in his Cercle.

Most CSCOM are run by an Association de Santé Communautaire (Community Health Association, ASACO). They provide basic preventative and curative services in maternal and child health.

At each level of the health system cost recovery is put in place for consultations and also for medicines and any other supplies used in their treatment. People can become members of ASACOs and pay a yearly membership fee and then have a reduced consultation fee. In theory when patients are referred to a higher level of the health system their consultation fee is waived.

Figure 2 – The different levels of the Malian Health System



In Mali there is a large discrepancy between the human resources available in Bamako versus the rest of the country. In Bamako there are a total of 4,030 healthcare workers versus only 3,279 for the remainder of the country.⁷ This variation in access to healthcare is also shown in the difference with regards to the number of CSCOM and CSREF people have access to in different areas.

Table 1 – Comparison of the number of CSCOM and CSREF between different areas in Mali

Area	Population ⁸	Number of CSCOM and CSREF	Population per facility
Bamako District	1,112,002	54	20,593
Region of Tombouctou	464,376	35	13,268
Cercle of Sikasso	569,866	35	16,282
Cercle of Douentza	164,437	8	20,555
Cercle of Kadiolo	147,432	16	9,215

In looking at this information 3 other factors should be noted:

- Distances and accessibility are not the same in each of the areas
- Availability of private health clinics is greater in urban areas, especially Bamako
- Quality of care and personnel available varies greatly between each region

2.6. Implementation of RAPIA in Mali

In collaboration with Santé Diabète Mali (SDM) and the support of the Ministry of Health, the Direction Nationale de la Santé, Dr. A. Nientao and the financial support of the Diabetes Foundation (UK) the IIF carried out the RAPIA in Mali.

Mali was chosen as it is a “Highly Indebted Poor Country” (HIPC). The World Bank has defined an HIPC on the basis that the demands on these countries for debt repayment heavily exceed their ability to generate income, and as a consequence, programmes of social investment including health are suffering.

Implementing the RAPIA in an HIPC was to see how a sustainable solution can be found to the issues of access to insulin and proper diabetes care under extreme conditions of scarce resources in the health sector.

The Project Coordinator in collaboration with SDM carried out the RAPIA in Mali over a period of a 7 weeks. In total 110 interviews and approximately another 40 informal meetings and discussions were held in 4 distinct areas of Mali – District of Bamako (City of Bamako), Sikasso (City of Sikasso and Cercle of Kadiolo), Timbuktu (City of Timbuktu) and Mopti (Cercle of Douentza) (See Map in Appendix 3). These four areas were chosen by local stakeholders due to their geographical distribution and differences in economic situation. A detailed table of the different numbers of interviews can be found in Appendix 4.

Table 1—Numbers of interviews and discussions for RAPIA in Mali

Area	Patient	Pharmacy	Healthcare worker	Traditional Healers	Health Facilities	Regional level	National level
Bamako	18	11	12	10	8	1	20
Sikasso and Kadiolo	11	6	7	8	5	5	
Timbuktu and Douentza	10	3	5	2	3	5	
Total	39	20	24	20	16	11	20

Each interview had as its main aim to obtain the person's perspective on the problems faced by people with diabetes in Mali in gaining access to insulin and proper diabetes care, rather than seeking precise statistical information.

3. Type 1 Diabetes in Mali

There are no data on the incidence or prevalence of Type 1 diabetes in Mali. Experts in Mali believe that there are between 1-2% of the population with diabetes. This would mean that there are approximately 150,000 people with diabetes, 15,000 of which would have Type 1 diabetes. The IDF estimates that there are a total of 4,685 people with diabetes in Mali, 790 of them with Type 1 diabetes. These estimates do not take into account that many patients are undiagnosed.

Based on discussions with two leading physicians in Mali, a study carried out by SDM⁹ and interviews with patients it can be estimated that about 40% of patients on insulin can be classified as having Type 1 diabetes and that they represent 10% of all patients with diabetes. Less than 10% of people with Type 1 diabetes are children under the age of 15.

A lack of children with diabetes was apparent during interviews with patients, local diabetes associations and healthcare workers. Anecdotal information was collected with regards to:

- Children dying due to poor initial diagnosis, in some cases being placed on a glucose drip having been misdiagnosed as having malaria
- Children being diagnosed, but their families no longer able to pay for their medication
- Complications leading to death

Registers kept at different facilities provided little or no indication on the numbers of people with diabetes in the areas studied. During interviews with different healthcare workers in the areas studied the following numbers of patients with diabetes being cared for was estimated.

Table 2 – Estimates of patients with diabetes based on interviews with healthcare workers

Location	Population ⁸	Number of patients with diabetes	Number of patients with Type 1 diabetes	Prevalence of Type 1 diabetes per 100,000 population
Bamako	1,112,002	3,100	310	27.88
Sikasso	1,888,162	340	34	1.80
Timbuktu	464,376	134	13	2.89
Kadiolo	147,432	20	2	1.36
Douentza	164,437	3	0.3	0.18

Assumptions:

- Patients attended clinics for their diabetes care once a month
- No overlap in patients from different facilities within the same area, or patients from different regions going to Bamako for care
- Proportions of Type 1 and Type 2 patients based on above estimates

Assuming that the rest of Mali has a prevalence of Type 1 diabetes similar to outside of Bamako, it can be estimated that overall there would be 453 people with Type 1 diabetes.

An estimate of the numbers of patients with diabetes in Mali was also calculated using the quantity of insulin supplied from the two main private wholesalers to both the private and public sectors. Then using the estimates (above) of 40% of patients on insulin having Type 1 diabetes, an approximation might be made of the prevalence of Type1 diabetes in Mali. These extrapolations are given in Table 4, along with an estimate of total diabetes prevalence based on Type 1 diabetes representing 10% of the total.

Table 3 – Estimating the number of people with diabetes in Mali based on insulin ordered

Region	Total Insulin Ordered per year (10ml vials of 100 IU)	Number of people with “Insulin requiring diabetes”^{1, 2}	Number of people with Type 1 diabetes	Total prevalence of people with Type 1 diabetes
Bamako	7,799	600	240	21.58
Sikasso	562	43	17	0.90
Timbuktu	187	14	6	1.29
Total for Mali	15,005	1,154	462	4.49

¹ - People with “Insulin Requiring Diabetes” include people with Type 1 diabetes (those needing insulin for survival) and people with Type 2 diabetes (those needing insulin to keep their diabetes stable)

² - It is estimated that a patient will use approximately 13 vials of insulin per year¹⁰

The figures are similar to those in Table 2. They show that around half of the national insulin consumption, and in consequence around half of the estimated number of diabetic patients, are in Bamako, with a prevalence of Type 1 diabetes of 21.58 per 100,000 compared to only 0.90 and 1.29 per 100,000 in Sikasso and Timbuktu (Table 4). In comparison to the IDF figures there are almost 3 times more patients with Type 1 diabetes in Bamako than expected possibly because of patients travelling for care, or perhaps representing better survival. In both Timbuktu and Sikasso there are respectively 12 and 15% of the expected number of patients (See Appendix 5 for more details). However overall there are only about half as many patients in Mali as estimated by the IDF. This may be because of :

- Underestimates of total insulin consumption in Mali. The estimates above are based on insulin orders through the two main private wholesalers and some insulin is known to come directly from abroad
- The IDF uses data from Nigeria and not Mali
- The IDF estimates are based on data for type 1 diabetes incidence and national life expectancy
- Many patients may be undertreating (using less insulin than they should be) their diabetes because of cost
- Many patients are dying undiagnosed

Using the methods employed by the IDF Diabetes e-Atlas¹¹, the table below shows that the life expectancy of people with diabetes varies greatly from one area of Mali to the other.

Table 4 – Life Expectancy for a person with Type 1 diabetes in Mali

Age Range	0-14	15+
Mali¹		
Life Expectancy	1.5*	12.3
Mali²		
Life Expectancy	0.96	10.98
Bamako²		
Life Expectancy	3.02	73.34
Sikasso²		
Life Expectancy	0.20	4.73
Timbuktu²		
Life Expectancy	0.31	7.61

¹ – Based on IDF calculations and data

² – Based on IIF calculations and data

* – Minimum value for Life Expectancy estimated by the IDF for a person living in a situation with no access to insulin and care

Assumptions:

- 5% of all people with Type 1 diabetes are under 15 (from observations and discussions)
- 46.1% of the population of Mali is under the age of 15⁸
- Incidence in age range 0-14: 1.0/100,000 (IDF¹¹)
- Incidence in age range 15+: 0.67/100,000 (IDF¹¹)

The high estimate for life expectancy in Bamako is untenable, and is probably due to many patients from other regions going to Bamako to seek care (in a study by SDM⁹ 28% of interviewees came from outside Bamako for their care) due to the higher quality of care in Bamako.

4. Mali’s medicine supply

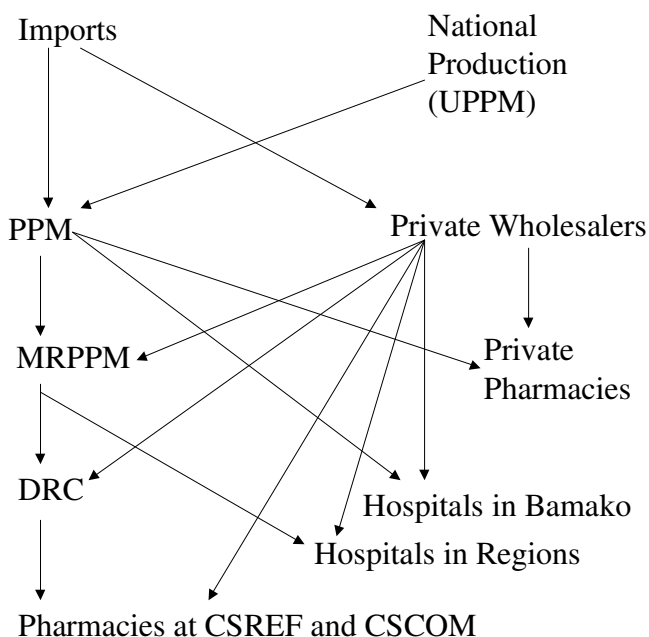
Mali has an Essential Drugs List based on the World Health Organisation’s (WHO) model. On the policy side Mali has the Departement de la Pharmacie et du Médicament (Pharmacy and Medicines Department, DPM). This department establishes Mali’s political framework and policies with regards to medicines and also gives authorisations for medicines to be sold in Mali.

The Pharmacie Populaire du Mali (Central Medical Stores, PPM) is a parastatal organisation in charge of the purchase and distribution of medicines. Tenders are prepared PPM and checked by the Direction Marche Publique (Public Markets Directorate) which reports to the Ministry of Finance. It takes 3-6 months for tender to be prepared.

In theory the PPM is the only supplier of the public sector. It supplies medicines to Magasin Regional de la PPM who in turn supply the Dépôt Répartiteur de Cercle (Cercle Depository, DRC). The DRCs are located within the CSREF for a specific Cercle. These then distribute to the CSCOM. Due to problems with supplies each level of the system from the MRPPM to the CSCOM often get their supplies from the private sector. The National Hospitals as they are based in Bamako get their supplies directly from the PPM. It should be noted that in theory only hospitalised patients should use the pharmacies present at the Hospitals.

The private sector also plays an important role in Mali. There are a few private wholesalers who distribute medicines throughout the country. There are many private pharmacies throughout Mali. These can also be supplied by the PPM.

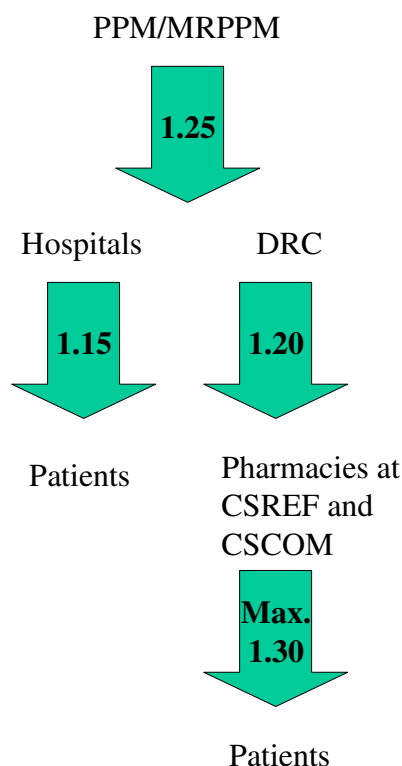
Figure 3 – Observed supply of medicines during RAPIA



The prices of medicines are set by the government for both the public and private sectors. Each time a medicine changes hands there is a mark-up determined by the government. For example when a private pharmacy receives a medicine sold by a private wholesaler the sale price to the patient is already indicated. This depends on the medicine.

In the public sector there are coefficients determined for each level. For example a medicine bought by the PPM at €1, is sold to hospitals and the DRCs at €1.25. At hospitals this medicine is sold to inpatients at €1.44. The DRCs sell this medicine to pharmacies at CSCOM and CSREF at €1.5 who can then sell it to patients at a maximum of €1.95.

Figure 4 – Mark-ups on medicines in the public sector



In the public sector quantification of needs goes from the lower levels of the health pyramid to the PPM. MRPPMs are supposed to be supplied monthly as are DRCs. Pharmacies at CSCOM and CSREF should be supplied quarterly.

In the public sector problems with distribution and maintaining a cold chain exist. These problems do not exist in the private sector.

It is hard to estimate total expenditure on medicines in Mali as a large portion of medicines is bought in the private sector. The PPM has a turnover per year CFA 7-8 billion (€10,654,490-€12,176,560). An estimate would say that this represents anywhere from a third to half of the total expenditure.

4.1. Mali's insulin supply and its quantification

The latest version of Mali's Essential Drug List (2004) has both Actrapid and Insulatard 100 IU/ml on the list. Insulin should be available at Hospitals and Referral Health Centres (CSREF). All insulin received in Mali is human 100 IU/ml Novo Nordisk insulin. Appendix 6 contains more information about Mali's purchase of insulin.

In August 2004, for the first time in 2-3 years, the PPM received 500 vials of Insulatard and 300 of Actrapid. This insulin was shipped to 3 PPM depositories in Bamako and the MRPPM in Timbuktu. These quantities were determined by the Pharmacy and Medicines Department of the Ministry of Health (DPM). It can be estimated that this amount of insulin

is around one year's supply for approximately 60 patients with Type 1 diabetes (around 10% of the estimates made above).

Even though insulin is an essential drug, the reasons it may not have been imported by the PPM in the past are:

- PPM was unable to find insulin produced by a generic manufacturer
- Insulin is costly and the PPM needs to prioritise its limited budget
- There are not many suppliers of insulin – the PPM when preparing a tender needs to get quotes from 3 suppliers

Most insulin in Mali is purchased through two private wholesalers from an intermediary in France. These wholesalers provide insulin throughout the country to both the private and public sector.

In each area visited, except for Douentza, insulin was present at one source or another for patients to purchase.

In Bamako it was present for patients to purchase in many private pharmacies, the pharmacies at the two main hospitals, one PPM depository and at the Diabetes Association's Clinic.

The Association receives its insulin from one of the private wholesalers (using a donation from the WHO), direct purchases and also donations.

Insulin was available only in the private sector in Sikasso (6 pharmacies) and Kadiolo (1 pharmacy). In Timbuktu until October 2004 insulin was available only at the single private pharmacy there. However, at that time the Timbuktu MRPPM received 10 vials of Actrapid and 10 vials of Insulatard from PPM, although the security of the cold chain for these supplies is uncertain. (See Appendix 7 for quantities of insulin ordered in Mali)

Insulin shipped by the private sector is sent to Timbuktu by plane. In other areas it is shipped by bus in coolers.

The CSREF in Timbuktu also has a limited amount of insulin in cartridge form, donated by an individual in France. This insulin is given to poor individuals.

In looking at the geographical distribution of insulin, 52% of insulin is ordered in Bamako. This may be due to many people coming from other areas of Mali to get their insulin there, or having family members purchase insulin in Bamako to send it to them in other regions. (See Appendix 8 for more details)

By not having any reliable data on patient numbers quantification of insulin needs is extremely difficult. At present, quantification is done based on past consumption in the public sector (PPM, MRPPM and health facilities). This is neither efficient nor reliable as because supplies at public facilities are variable patients do not necessarily go to the public sector for their insulin. In addition, private pharmacies in Bamako are located throughout the city and are easily accessible to patients, implying that they are a more reliable and speedier source of insulin for patients.

The private wholesalers can be supplied in 24-48 hours and therefore can also supply their customers in that timeframe. In the public sector as purchasing procedures are complex and lengthy there is not the same flexibility as in the private sector.

4.2. Price of Insulin

About a year ago Mali changed from 40 IU/ml insulin to 100 IU/ml insulin. The unit price increase for a 10ml vial from CFA 2,720 (€4.14) to CFA 6,110 (€9.30), made a huge impact on patients, despite the small reduction in price per unit (CFA 68 (€0.10) to CFA 61 (€0.09)).

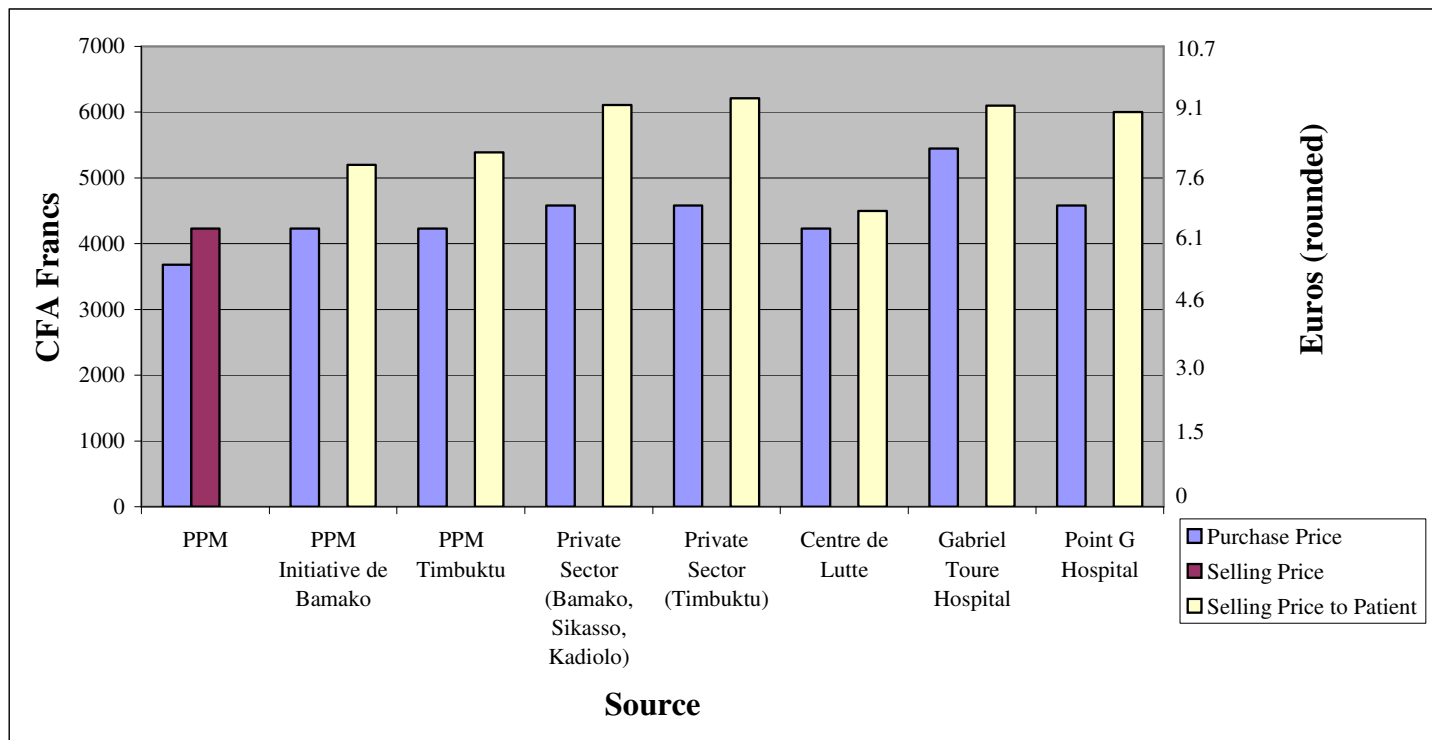
Insulin is received by the PPM Cost Insurance and Freight (CIF). This means that the insurance and delivery of goods to the destination is paid for by the supplier. The buyer is responsible for the import customs clearance and other costs and risks.

Insulin and all other medicines are subject to 2.5% duty. This duty is divided into 3 portions:

- 1.5% “Relevance Statistique” (Statistical Tax)
- 0.5% “Prélèvement Communautaire de Solidarité” (Community Solidarity Levy)
- 0.5% “Prélèvement Communautaire” (Community Levy)

The Gross Domestic Product (GDP) per capita, adjusted for Purchasing Power Parity, in Mali is estimated at € 693¹². This means that a year’s supply of insulin would account for approximately 17% of a family’s income.

Figure 5 – Graph of the different prices of Insulin in Mali



The graph above shows the different prices that insulin is bought and sold by different sources. It should be noted that the only source used by patients interviewed during the RAPIA was the private sector. The reason for this is insulin is often unavailable in the public

sector and even when it is available at certain hospitals or public pharmacies patients are unaware of this.

The average price of insulin in Mali, calculated during the RAPIA, is CFA 5,644 (€ 8.59) (A more detailed analysis of the price patients pay can be found in Appendix 9). The Novo Nordisk LEAD initiative began in 2001 and was aimed at the 49 Least Developed Countries (LDCs), as defined by the United Nations. This initiative was to sell insulin to the public sector in these countries at prices that should not exceed 20% of the average price in the industrialised countries of North America, Europe and Japan. According to Novo Nordisk's LEAD Initiative¹³, Mali should be purchasing insulin at a price of approximately € 3.25 (CFA 2,135).

5. Access to Syringes

Syringes are present only in the private sector. The PPM has ordered 10,000 syringes, but as of October 2004 it had not yet received them. Syringes, Glucometers and other equipment for diabetes care have 5% VAT on them.

The average price a patient pays for a syringe is CFA 160 (€ 0.24) (range CFA 100 (€ 0.15) to CFA 200 (€ 0.30)). In Timbuktu syringes are sold at the private pharmacy for CFA 300 (€ 0.45).

Patients did not complain of problems accessing syringes. On average patients changed their syringes every 4 days.

Of concern to some physicians is that 40 IU syringes are still being sold and patients are not aware that they are not injecting the right amount of insulin.

6. Access to Diabetes Care

6.1. Overview

The aim of the government's health policy is to¹⁴:

- Improve the state of the population's health in order for them to fully participate in the socio-economic development of the country
- Extend the health coverage to increase accessibility of the population to health facilities
- Make the health system more viable and effective

Together with this policy, the Essential Drugs list and the list of essential equipment have the following aims:

- Each Community Health Centre (CSCOM) should have a glucometer and urine glucose strips and the means to refer a patient to a CSREF and then be able to carry out the patient's follow-up
- Each CSREF should have a Spectrophotometer (for blood glucose measurement) and insulin present and be able to care for a patient with diabetes and only refer complicated cases to the Hospitals
- Regional Hospitals should have a Spectrophotometer or other equipment (for blood glucose measurement), insulin and trained staff for the treatment of diabetes, complicated cases and complications.

In the 5 areas visited during the RAPIA, there were various organisational and supply problems that make the above requirements inapplicable thereby compromising diabetes care.

In Mali there is only one diabetologist who is based at Gabriel Touré Hospital who also consults at the Centre de Lutte. At the Point G Hospital, diabetes care is dispensed by an endocrinologist. This physician is also a Professor at the Medical School and has students as interns in her department. These two physicians are known throughout Mali and are the “highest level” of referral in Mali.

6.2. Bamako

Patients in Bamako can enter the health system at any level CSCOM, CSREF or Tertiary care (See Appendix 10 for diagram of a patient’s potential pathway in Bamako). Once a patient is diagnosed as having diabetes there are 3 possibilities for his/her treatment and follow-up:

- Centre de Lutte
- Gabriel Touré Hospital
- Point G Hospital

The Centre de Lutte is a Clinic run by the AMLD. There is a clinic every day run by 2 doctors with nurses supporting their work. The Clinic has room for admitting patients. The patient arrives at the clinic and has a blood glucose done using a glucometer. If blood sugar is high then ketonuria is measured. The patient is then seen by a doctor and given a new treatment regimen or has his/her prescription renewed.

At Gabriel Touré Hospital outpatient diabetes consultations are carried once a week by the only diabetologist in Mali. He has an intern, nurse and a medical technician who assist him. Patients have their blood glucose done using a Glucometer in the consulting room or are referred after having had their blood glucose done at the laboratory. Depending on their level of blood glucose appropriate action is taken. Patients with complications or high levels of glucose can be admitted at Gabriel Touré Hospital. As the diabetologist also consults at the Centre de Lutte some of his patients follow him there when he consults there. There is also a day for inpatient consultations.

Point G Hospital is also the teaching hospital for the medical faculty. The diabetes outpatient clinic is run by an endocrinologist once a week. A similar patient pathway as at Gabriel Touré can be observed. Once a week patient education sessions are carried out for newly diagnosed patients and their families.

In Bamako patients are also sometimes followed in the private sector or by other doctors once their treatment regimen is established.

Most patients complained of long waiting times 2-4 hours depending on the day and place where they were having their consultation. Many times patients are seen in groups and said that doctors had very little time to explain different aspects of their treatment and condition. The AMLD has created a small booklet for doctors to write down patient information each time they are seen. Other patients have a small notebook where doctors can do the same. This system is not standardised.

6.3. Sikasso and Kadiolo

All CSCOMs in Sikasso have no means to diagnose diabetes. In Sikasso the situation is slightly different from that in Bamako with no clearly identified structure or a doctor who specifically cares for people with diabetes. Patients are followed by the doctor who diagnoses them. There are currently 3 doctors who follow patients with diabetes at the Hospital in Sikasso. At the CSREF in Sikasso a doctor and a nurse treat all patients with diabetes. Patients with complications or difficult cases are referred to Bamako. (See Appendix 11 – Patient pathway in Sikasso)

In Kadiolo, by chance, there happens to be a young doctor who studied under the endocrinologist at the Point G. He is able to diagnose and establish treatment regimens for the patients in Kadiolo. For complications patients are referred to Sikasso Regional Hospital or Bamako.

6.4. Timbuktu and Douentza

In Timbuktu both the hospital and the CSREF provide care to patients. A few patients are followed at the Hospital. Patients are cared for by the doctor who diagnosed them even though one doctor is designated as the person who cares for people with diabetes.

At the CSREF two doctors care for patients with diabetes. One had received specialised training by a French doctor, the other had studied under the leading endocrinologist during his studies. All cases of diabetes at the CSREF are referred to them.

The diabetes care offered by the CSREF is well appreciated by patients in Timbuktu and through word of mouth the CSREF has become the main centre for diabetes care in Timbuktu.

Some complications can be treated in Timbuktu if not the patient is referred to Bamako. This path is described in Appendix 12.

In Douentza there is no care available for patients with diabetes. Once a patient is diagnosed they are referred to Mopti Regional Hospital. The doctors at the CSREF can carry out the follow-up and make sure that the patient adheres to their treatment. Referral for complications is done either to Mopti Regional Hospital or to Bamako.

Two factors should also be taken into consideration:

- Referrals are costly and difficult both physically (in terms of travel) and financially for patients.
- Consultation fees must be paid at all levels of the health system. Some safeguards are in place for extremely poor patients (cards for indigents), but these are often complex. Consultation fees in the public sector vary from CFA 200 (€ 0.30) to CFA 1,000 (€ 1.50). These depend on what facility the patient visits, and also for CSCOM and the Centre de Lutte if the patients are members.

7. Diagnostic issues

According to a list of equipment provided by the Ministry of Health, each CSCOM should have a glucometer. This same list states that each CSREF should have a Spectrophotometer.

From the data collected during the RAPIA the following was observed.

Table 5 – Availability of various diagnostic tools in Mali

Location and level of health service	Number studied	Presence of Urine Glucose Strips	Presence of Ketone strips	Presence of Glucometer	Presence of Spectrophotometer or other lab equipment for blood analyses
CSCOM	19	32%	0%	16%	0%
CSREF	6	100%	17%	100%	50%
Hospitals and Tertiary level care centres	5	80%	60%	80%	80%

At all levels there were problems with supplies of urine strips, strips for Glucometers, tubes for analyses and reagents. All laboratory technicians stated that the only reliable supply of reagents and tubes was from the private sector, as orders from the public sector were not always complete. However this was a problem as supplies were expensive.

Most private wholesalers do not carry testing materials such as Glucometers and strips for these as there is no sustained demand.

It should be noted that there are 2 private laboratories in Bamako that offer extremely high quality tests at similar prices to those in the public sector.

Prices for blood glucose (using a Glucometer or other means) vary from CFA 550 (€ 0.84) to CFA 2,000 (€ 3) and for urine glucose from CFA 225 (€0.34) to CFA 1,500 (€ 2.28) in all regions and in the public and private sectors. There was no systematic difference between the public and private sector, or in different regions of the country. Appendix 13 shows the average costs in the different areas studied.

8. Training

Many doctors said that they were scared of insulin and diabetes. This is due mainly to a lack of training. During their studies there are specific courses on diabetes in the 3rd, 5th and 6th years. These courses focus first on diabetes as a disease, the different types of diabetes and then how to care for a patient.

Besides this basic training no other training is available for staff, unless they work with one of the two specialists at Gabriel Touré or at the Point G Hospitals, or if they have done their internship at the Point G Hospital in endocrinology.

Other courses organised by external partners have been carried out, but not in an organised and systematic way.

9. Association Malienne de Lutte Contre le Diabète (AMLD)

The AMLD in Bamako runs two main activities:

- Activities for World Diabetes Day
- The Centre de Lutte

It has a 1,000 members in Bamako. The main benefit for their members is a cheaper consultation at the Centre de Lutte. The Association is a member of the IDF and its main

source of funds is from consultation fees and the Lion's Club. The Association's membership comprises doctors and patients. The stated aims of the Association include data collection, education and care, training, and peer support.

The AMLD has also helped establish branches in Sikasso and Timbuktu. In Sikasso the diabetes association views its role as a support group and an advocate for diabetes at a local level. Every month a discussion group is held where patients can exchange information on different aspects of diabetes. The association has 50 members, no office, no resources or real contact with health professionals. The Timbuktu branch has 60 members and as in Sikasso has no office space or resources to carry out its work. They view their role as trying to establish a similar structure to the Centre de Lutte in Bamako. They have close contact with the two doctors at the CSREF. Both associations feel that the association in Bamako does not represent them properly and that they feel very weakly associated to them.

Recently a group of patients "Regroupement des patients du District de Bamako" (Grouping of Patients of the District of Bamako) was created. This is an association of only patients whose role is to act as the "voice" of patients in Bamako. There is a partnership with the AMLD, but there is no clear indication as to how these two organisations will collaborate. It was felt during discussions that the Regroupement was created as the AMLD was not viewed as providing adequate support to patients (advocacy, discussion groups, etc.) and that its only role was one of providing care.

10. Policy Framework

A new section on NCDs will be included in Mali's new health policy document. Three NCDs have been chosen:

- Diabetes
- Hypertension
- Sickle Cell Anaemia

This document aims to tackle a growing challenge of NCDs in Mali and provides an excellent basis as a working document. The policy document includes a wide range of actions and is extremely ambitious. It does not take into account various regional differences and also the existing capacity in these regions. For example it includes the proposal that care of diabetes should be dispensed at CSCOMs. However, during the RAPIA it is apparent that this level of Mali's health system does not have the material and human resources to tackle this. Also in the document there is no mention of how to tackle the issue of availability and cost of medicines and treatment.

11. Registers

Mali has a system for data collection that collects data from the peripheral areas and sends this information to the regional and central levels. The SLIS collects information on pre-natal services, immunisation rates, data on various communicable diseases and usage of health services.

It does not contain any information on NCDs or diabetes.

12. Traditional Healers

Traditional Healers are an integral part of healthcare provision in Mali. 83% of the 18 Traditional Healers interviewed were members of the Fédération Malienne de Tradithérapeutes (Federation of Malian Traditional Healers, FEMAT). The FEMAT actively

collaborates with the Traditional Medicine Department (DMT) at the Ministry of Health, which aims to foster the interaction between modern and traditional medicine. Currently there are pharmacological tests being carried out on a traditional remedy for diabetes.

When interviewing healthcare workers about the interaction between modern and traditional medicine, a majority stated that Traditional Healers “Never” referred patients to them. However, 28% of Traditional Healers say they “Always” refer patients to allopathic healthcare and 44% “Sometimes” do. Many traditional healers stated that they cared for patients for a certain time and if within that timeframe they did not improve they send them to allopathic facilities. It was interesting to note that some traditional healers also ask some of their patients to get analyses done at health facilities as part of their treatment. Many traditional healers would welcome closer collaboration with allopathic medicine and to learn more about diabetes.

13. Other Issues

Even though the focus of this report is Type 1 diabetes, throughout this project it is apparent that people with Type 2 diabetes face the same problems as those with Type 1 with regards to diagnosis, care and treatment. It should be noted that oral hypoglycaemics are extremely expensive in the private sector and not always available in the public sector. Diet is also a problem with variable accessibility to healthy foods due to seasonal availability and cost. Most dietary advice provided to patients is not based on local foodstuffs and eating habits.

Another problem that is apparent is the donation of medications and materials from outside Mali without any control or concern for sustainability. For example insulin pens are donated without refills being available on the local market, a variety of glucose meters are not used as the strips for them are unavailable in Mali.

14. Some positive points

- Strong political will all at all levels and recognition of diabetes as a Public Health problem
- Dynamic physicians and Diabetes Associations in all regions visited
- The WHO country office and the Head of the NCD Programme are investigating implementing the WHO STEPs Approach for NCD risk factors
- The French NGO SDM provides Mali a unique opportunity with expertise in the area of nutrition and research and its competencies provide a valuable resource
- The activities for World Diabetes Day organised by the AMLD generate a substantial amount interest and publicity around diabetes.

15. Discussion

During our interviews many respondents commented on how the RAPIA process raised awareness of the problem that people with diabetes face. Most patients were grateful and spent a lot of time talking to the people interviewing them. Many patients outside Bamako felt abandoned by the health system and their colleagues in Bamako and were grateful to have someone to listen to their problems.

Through these discussions not only was much information collected, but some awareness may have been created. The development of a policy on Non-Communicable Diseases in Mali is a positive development in creating the proper environment for treating patients suffering from Type 1 diabetes. For all diseases two parallel paths need to work together: the path of medicines and supplies and the path of care. The path of medicines and supplies,

starts with their arrival in the country and ends with the patient receiving his/her treatment. This path, however, needs to be complemented by the path of care, which starts with government policies and training of healthcare workers and ends with the interaction between the patient and this worker. If at any point along these two paths a problem or a barrier is present, this will affect the efficacy of healthcare.

The recommendations presented below are specific to Type 1 diabetes. However for feasibility and rational use of scarce resources in Mali, these can and should be applied to all Non Communicable Diseases.

16. Recommendations

Keeping in mind the resource restrictions present in Mali the following recommendations aim to make best use of limited resources and also to benefit other areas of the healthcare system in Mali.

The recommendations below and their action points are to serve as a guide to the stakeholders involved in decision process. Prioritisation of these needs to be decided by local stakeholders.

Problem	Recommendation	Action	Stakeholders	Timeframe
Data and Information:				
- No standardised means of collecting information on patients	- Develop standardised patient information sheet or record keeping system	- Agreement on standardised approach to keeping records - Development of patient information sheets - In parallel ensure distribution of “carnets de suivi” (follow-up booklets) to patients (or patients to purchase booklets) - Distribution of information sheets to different facilities	MoH, DNS, CPS, WHO, Clinicians and SDM	Short to Medium term
- Lack of information on the number of people with diabetes in Mali	- Carry out a basic survey to assess the prevalence of diabetes in Mali	- Using data collected above carry out a study to establish the profile of diabetic patients and diabetes in Mali - Decision to be made by MoH and DNS whether or not to carry out further study using WHO STEPs	MoH, DNS, CPS, WHO, Clinicians and SDM	Medium term
Insulin:				
- Not available to patients at lowest possible price	- Join the Novo Nordisk LEAD Initiative - Registration of generic insulin manufacturer	- MoH and DPM in collaboration with the IDF to write a letter to Novo Nordisk asking for specific criteria to join LEAD Initiative - MoH and DPM to initiate contacts with generic insulin manufacturers for registration in Mali	MoH, DPM and IDF	Short term

Problem	Recommendation	Action	Stakeholders	Timeframe
Insulin continued				
- Not available, without disruption, in the public sector	- Develop proper purchasing and distribution mechanisms at the Pharmacie Populaire du Mali (PPM)	- DPM and PPM to decide whether or not insulin and syringes will be supplied in the long term - Once decision is made publicise information to health facilities and public that PPM will distribute insulin to all public facilities - Within information include order form for facilities to order insulin if they want	DPM and PPM	Short term
- Too expensive for patients	- The above recommendations with regards to the purchase of insulin should help lower the price, but the government should decide whether insulin should be provided free of charge or at a subsidised cost to some or all patients	- MoH, DNS and other stakeholders to discuss feasibility and sustainability of providing insulin free or at a subsidised cost to patients	MoH, DNS, AMLD, Clinicians	Short term
Materials:				
- Syringes not available in the public sector	- Add syringes to Essential Drug list	- DPM to add insulin syringes to next version of Essential Medicines list - PPM to identify source for syringes and inform facilities that they will carry syringes - Ask for orders from facilities for syringes - Inform AMLD	DPM and PPM	Short term

Problem	Recommendation	Action	Stakeholders	Timeframe
Materials continued				
- 5% Value Added Tax (VAT) on syringes	- Remove 5% VAT on all materials necessary for proper diabetes care	- MoH, DPM, Clinicians and AMLD to identify all materials used by people with diabetes - MoH to discuss with MoC and MoF possibility of removing VAT from materials listed above	MoH, MoC, MoF, DPM, Clinicians and AMLD	Short to Medium term
Diabetes Care:				
- No guidelines or treatment protocols	- Adapt International Diabetes Federation (IDF) guidelines to Mali	- IDF to provide Mali with any guidelines or protocols - Clinicians and DNS NCD to adapt to Mali's needs	IDF, DNS NCD and Clinicians	Short to Medium term
- Sub-optimal use of existing health pyramid in Mali - No organisation and coordination of referrals and care - Long waiting times - Lack of patient education	- Better organisation of diabetes consultations	- Definition of role of each level of care - Definition of referral pathways - Identification of regional focal points - Organisation of diabetes clinics - Inclusion of Centre de Lutte in public health system - Dissemination and utilisation of treatment guidelines and protocols	All	Short to Long term
Diagnosis:				
- Lack of availability of appropriate materials at the appropriate levels of the health system	- Develop a realistic and sustainable Essential Equipment list for each level of the health system	- Adapt equipment present according to future plans for pattern of care	MoH, DPM, PPM, etc.	Medium term
- Problems with the supply of reagents and other materials to laboratories	- Develop a supply chain for laboratory materials	- Identify what public sector is able to supply - Identify local suppliers in the private sector - Develop an agreement with them, either on a national level or separately for each facility.	DPM and private sector	Short to Medium term

Problem	Recommendation	Action	Stakeholders	Timeframe
Healthcare worker education:				
<ul style="list-style-type: none"> - Lack of basic knowledge of diabetes by frontline healthcare workers - No continuing education and training 	<ul style="list-style-type: none"> - Improve basic healthcare worker training to include more on diabetes care and NCD management 	<ul style="list-style-type: none"> - Development of training modules for frontline healthcare workers - Develop continuing education modules - Where possible use IDF material already developed 	DNS, DAF, Clinicians, IDF, SDM	Medium term
Diabetes Association:				
<ul style="list-style-type: none"> - Diabetes Association needs clearer definition of its role and organisational structure on a national level 	<ul style="list-style-type: none"> - Diabetes Association to analyse its role in care and support of people with diabetes in Mali - Organisation of the AMLD as a national entity 	<ul style="list-style-type: none"> - Discussion with all members of what the role of the association should be - Integration of the “Regroupement” within the AMLD - Organisation of a national meeting to define national aims and organisational structure 	AMLD	Short term
Other:				
<ul style="list-style-type: none"> - Better cooperation and coordination between all stakeholders (Ministry of Health, WHO, clinicians, AMLD, SDM, etc.) 	<ul style="list-style-type: none"> - Establishment of a working group on diabetes in Mali 	<ul style="list-style-type: none"> - A working group encompassing all stakeholders needs to be created in order for different competencies to be brought to improving care for people with diabetes 	All	Short to Medium term
<ul style="list-style-type: none"> - NCD Policy document does not take into account the realities of diabetes outside Bamako 	<ul style="list-style-type: none"> - Reorientation of the policy document based on the RAPIA findings 	<ul style="list-style-type: none"> - Policy document to take into account findings of the RAPIA 	DNS NCD	Short term
Other continued				
<ul style="list-style-type: none"> - Lack of coordination with regards to donations 	<ul style="list-style-type: none"> - Establishment of donation guidelines and control mechanisms 	<ul style="list-style-type: none"> - AMLD to establish strict donation guidelines 	AMLD	Short term

Problem	Recommendation	Action	Stakeholders	Timeframe
- Traditional healers to be included in policy framework and activities around diabetes	- Inclusion of traditional healers in diabetes programmes	- Traditional Healers and the DMT to be included in policy and programme discussions on diabetes - Identification of traditional knowledge surrounding diabetes (already being carried out by SDM) - Definition of referral criteria	DNS NCD, DMT, FEMAT, SDM	Short to Medium term
- Overall financial burden on patients	- Find novel and sustainable ways to address the financial burden that diabetes puts on the individual and the health system	- Research ways other countries have dealt with the problem - Lowering the price of insulin (as per recommendation above) will have a significant impact	All	Long term

Short term: 2-6 months

Medium term: 6-12 months

Long term: More than 12 months

17. Presentation of Results

After the distribution of the Preliminary Report to local partners, Professor John Yudikin, Chairman, and David Beran, Project Coordinator, of the International Insulin Foundation, returned to Mali to present the report formally to stakeholders in Mali from 14/12-16/12/2004.

14/12/2004

A technical meeting was held at the Direction Nationale de la Santé (National Health Directorate, DNS). The following stakeholders were present:

- Dr. Sidibé, Endocrinologist, Point G Hospital (AS)
- Mrs. Ba, President, Association Malienne de Lutte contre le Diabète (AMLD) (MB)
- Dr. Nientao, Diabetologist, Gabriel Touré Hospital (AN)
- Dr. Cheka, Head of Supplies, Pharmacie Populaire du Mali (PPM) (SC)
- Dr. Diarra, Head of Non-Communicable Disease Programme, DNS (ND)
- Mr. Besançon, Project Manager, Santé Diabète Mali (SDM)(SB)
- Mr. Diarra, National Representative, SDM (AD)

The International Insulin Foundation (IIF) was represented by David Beran, Project Coordinator. (DB)

The main aim of the meeting was to discuss the IIF's report, highlight the important issues and prioritise the IIF's recommendations.

Comments made on each of the recommendations are detailed below:

- **Develop a standardised patient information sheet or record keeping system**
 - It was suggested to create a national standardised diabetes register
 - More investigation was needed to see what was feasible and how the data would be collected and reported
- **Carry out a basic survey to assess the prevalence of diabetes in Mali**
 - A prospective study or widespread screening would be too burdensome and resource intensive
 - It was suggested to use a retrospective study using the registers from Gabriel Touré and Point G Hospitals and the Centre de Lutte to gather basic information on patients with diabetes in Bamako and patients coming to Bamako for their care
 - The possibility of a medical student carrying out this work in collaboration with SDM was discussed and agreed upon by all those present
- **Improve purchasing and distribution mechanisms for diabetes medications, syringes and monitoring equipment at the PPM**
 - All those present agreed that this was a priority
- **Join the Novo Nordisk LEAD Initiative and initiate registration of generic insulin manufacturer**
 - DB explained the LEAD Initiative
 - It was agreed that the IIF and the International Diabetes Federation (IDF) would send Mali all the necessary information on the LEAD Initiative and provide the Director of the PPM with a list of generic insulin manufacturers
- **Add syringes to Essential Drug list**
 - All those present agreed that this was an important recommendation
 - It will be investigated how to go about this by ND, SC and the Département de la Pharmacie et du Médicament (Pharmacy and Medicines Department of the Ministry of Health, DPM)
- **Remove 5% VAT on all materials necessary for proper diabetes care**

- This recommendation was seen as important in reducing the overall financial burden of patients with diabetes
- However, as many government Ministries and Departments are involved, it was said to be a recommendation that would take quite some time to implement
- It was suggested that the AMLD send a letter to the Ministry of Health and DPM to raise this issue
- **Adapt IDF clinical care guidelines to Mali**
 - This recommendation was agreed upon unanimously
 - It was stated by AN that Mali received IDF documents, but that these were often in English
 - DB will communicate with IDF and IDF Africa to ensure that Mali receives the necessary documentation
- **Define the role of each level of the health system in each region in diabetes care**
 - DB and SB raised the issue that the organisation of care needed to be done at a national level, but also on a facility level
 - Both AS and AN stated that they were working on this in their individual diabetes clinics
 - ND said that the National Policy being developed on Non Communicable Diseases (NCD) would try to integrate this and that this would take some time as the current health system was organised around Communicable Diseases
- **Improve basic healthcare worker training to include more on diabetes care and NCD management**
 - All those present agreed that this was extremely important, and that training should be done on two levels:
 - Short-term: organise training sessions for personnel at Gabriel Touré and Point G Hospitals and at the Centre de Lutte
 - Long-term: develop material and integrate more courses on diabetes and chronic disease management into curriculum
- **Diabetes Association to analyse its role in the caring and support of people with diabetes across the nation**
 - It was stated that the distinction between the AMLD and the Centre de Lutte was not clear and that the AMLD should try to inform people on the distinction between the two entities
 - The aim is to fully integrate the Centre de Lutte into the government health system. This process will take quite some time.
- **In regions identify focal point for diabetes care**
 - It was agreed that ND would send an official note asking for focal points to be identified in each region
 - These people would then receive training in Bamako with the aim that they would then train their colleagues in the regions
- **Organisation of AMLD as a national entity**
 - The AMLD will work on this by organising site visits to the regions and clearly determining the role of the Bamako Headquarters with the Regional Associations
- **Establishment of donation guidelines and control mechanisms**
 - Information and education to patients is needed
 - The AMLD will start to address this problem more seriously
- **Adapt protocol for standardised diabetes consultations**
 - These will be included in the Policy Document
- **Develop a sustainable Essential Equipment list for each level of the health system**
 - Agreed as essential by all and to be investigated by ND with a view of integrating this into the NCD Policy document

- **Develop a supply chain for laboratory materials**
 - As above
- **Establishment of a working group on diabetes in Mali**
 - The working group was created. ND to send official letter of invitation to:
 - AN
 - AS
 - MB
 - SB
 - Other partners will be included in the discussion if necessary
- **Reorientation of the NCD Policy Document as relevant to diabetes based on the RAPIA findings**
 - ND stated that this was already being done
- **Inclusion of traditional healers in diabetes programmes**
 - All those present agreed that this was important
 - This point will be discussed with the Département de Médecine Traditionnelle (Traditional Medicine Department of the Ministry of Health) and included in the NCD Policy document
- **Find novel and sustainable ways to address the financial burden that diabetes puts on the individual and the health system**
 - Inclusion of diabetes as a “Social Disease” to relieve patients of financial burden
 - AMLD to send Ministry of Health a letter investigating this possibility

Based on this discussion the following 10 recommendations were identified as priorities for Mali and ranked in order of importance:

1. Improve purchasing and distribution mechanisms for diabetes medications, syringes and monitoring equipment at the PPM
2. Join the Novo Nordisk LEAD Initiative and initiate registration of generic insulin manufacturer
3. Add syringes to Essential Drug list
4. Organisation AMLD as a national entity
5. Establishment of a working group on diabetes in Mali
6. Adapt IDF clinical care guidelines to Mali
7. Carry out a basic survey to assess the prevalence of diabetes in Mali
8. Develop a sustainable Essential Equipment list for each level of the health system
9. Develop a supply chain for laboratory materials
10. Improve basic healthcare worker training to include more on diabetes care and NCD management

Action Points:

- Working Group on Diabetes to investigate technical aspects of developing register
- AS and SB to organise medical student to carry out basic survey
- DB to provide information on LEAD Initiative and generic producers to PPM
- ND, SC and DPM to investigate how to add syringes to Essential Drug List
- AMLD to send letter to Ministry of Health and DPM about removing 5% VAT on syringes and other materials
- DB to communicate with IDF and IDF Africa to ensure that Mali receives the necessary documentation
- ND to integrate role of each level of the health system in each region for diabetes care

- AN, AS and AMLD to organise training sessions for personnel at Gabriel Touré and Point G Hospitals and at the Centre de Lutte (short term)
- AN and AS to develop material and integrate more courses on diabetes and chronic disease management into curriculum (long term)
- AMLD to inform people of difference between AMLD and Centre de Lutte
- ND to send an official note asking for focal points to be identified in each region
- AMLD will organise site visits to the regions and clearly determining the role of the Bamako Headquarters with the Regional Associations
- AMLD to start addressing problem of donations more seriously
- ND to include protocol for standardised diabetes consultations within Policy document
- ND to include sustainable Essential Equipment list for each level of the health system within Policy Document and with the PPM develop a supply chain for laboratory materials
- ND to send official letter of invitation for the Diabetes working group to:
 - AN
 - AS
 - MB
 - SB
 - Other partners will be included in the discussion if necessary
- ND to adapt NCD Policy Document to RAPIA findings
- ND to discuss inclusion of Traditional Healers in diabetes programmes with DMT and include in Policy Document
- AMLD to send Ministry of Health a letter investigating the possibility of diabetes being classified as a “Social Disease”

15/12/2004

Site visits by Professor Yudkin, Mr. Beran and Mr. Besançon, to:

- Gabriel Touré Hospital
- Centre de Lutte

Discussion with different stakeholders regarding:

- Diabetes care
- Laboratory Testing
- Insulin prescription and pricing
- Role of diabetes association

Meeting with Dr. Diarra, Head of Non-Communicable Disease Programme, Direction Nationale de la Santé

- Dr. Diarra mentioned the problems identified by the RAPIA and stated that tackling NCDs in Mali was a new project
- He stated that the RAPIA had provided him with:
 - Concrete actions to be taken to address different problems
 - Information on the different regions
 - Functioning of the different health facilities with regards to diabetes
 - The capacity of the system to cope with diabetes care

Professor Yudkin and Mr. Beran highlighted the importance of taking the RAPIA recommendations and applying them to all chronic conditions.

16/12/2004

Presentation of results of the RAPIA at the Ministry of Health. The following people were present:

- Dr. Berthé, Representative, Laboratoire National de la Santé (National Laboratory)
- Dr. Cissé, Representative, WHO Mali
- Dr. Curti, Representative, Groupe Pivot Santé (Advisory Panel to Ministry of Health)
- Dr. Diallo, Technical Advisor, Ministry of Health
- Dr. Diarra, Head of Non-Communicable Disease Programme, DNS
- Dr. Keraubi, Directeur Département de la Lutte Contre la Maladie, DNS
- Dr. Nientao, Diabetologist, Gabriel Touré Hospital
- Dr. Sango, Representative, DPM
- Dr. Sanogo, Representative, Health Directorate for the District of Bamako
- Dr. Sanogo, Representative, Malian Pharmacist Association
- Dr. Sidibé, Endocrinologist, Point G Hospital
- Mr. Beran, IIF
- Mr. Besançon, Project Manager, SDM
- Mr. Coulibaly, Technical Advisor, Ministry of Health
- Mr. Diarra, National Representative, SDM
- Mrs. Ba, President, AMLD
- Mrs. Guindo, Director, PPM
- Professor Ag Mohamed, President, Malian Medical Association
- Professor Yudkin, IIF

The meeting was chaired by Dr. Diallo. Mr. Beran then presented the results of the RAPIA.

The floor was then opened for discussion. The following issues and questions arose after the presentation:

- Why did the RAPIA only address Type 1 diabetes?
- Clarification of the inclusion of Traditional Healers in the RAPIA's recommendations?
- Can the IIF help with another project to address both Types of diabetes and also all NCDs?
- Why wasn't the quality of insulin present tested during this project?
- What is the role of the Laboratoire National de la Santé in these recommendations?
- How can the issue of compliance be addressed?
- What is the role of the Diabetes Association and other NGOs in addressing this issue?

Professor Yudkin then made a statement regarding the extension of the RAPIA's recommendations from only Type 1 diabetes to both types of diabetes and all chronic conditions.

Mr. Beran answered the questions above:

- The RAPIA only addressed Type 1 diabetes as the IIF was created to look at this problem and find sustainable solutions to address access to insulin and diabetes care in developing countries. The recommendations, for example, for better healthcare worker training and laboratory equipment have implications for both types of diabetes.
- Traditional healers play an important role in the provision of care in Mali. For any plan on diabetes or any other NCD to work it needs to integrate this part of the health system as in most cases traditional healers are the first port of call. The current project in Sikasso being carried out by SDM on the use of traditional medicine by patients with diabetes will provide extremely useful information on how this can be done.
- It is not the role of the IIF and the RAPIA's results and implications can be used for both types of diabetes and also all NCDs.

- The quality of insulin was not tested during this project as it was not the aim of the project. A limited supply of insulin already exists in Mali and carrying out tests on quality would remove more insulin from an already limited supply. Also this is a complicated process and during this project the IIF saw that most of those involved in the supply of insulin did their best to store insulin properly.
 - Dr. Sidibé added that the problem of storage is mainly with patients and that education is needed to address this problem
- It was suggested that the Laboratoire National de la Santé could help with the elaboration of the list of materials to be present at different levels of the health system
- Compliance is a complicated issue. The association and clinicians have a role in addressing this. The main aim of this project was to ensure that people who want to treat themselves can, and that patients do not comply with their treatment because of problems of affordability or access.
- The association and other NGOs, such as SDM, have an important role to play in patient education and support.

The meeting was then closed and Dr. Diallo thanked the IIF for their work and said that as in Mr. Beran's presentation this was the first step in developing a system capable of delivering proper care for those with diabetes in Mali.

Site visit by Professor Yudkin, Mr. Beran and Mr. Besançon, to Point G Hospital and meeting with Dr. Sidibé. Discussion with Dr Sidibé regarding:

- Diabetes care
- Development of registers
- Use of a medical student to collect baseline data on patients with diabetes in Bamako to estimate prevalence of diabetes.

Following this visit the IIF, SDM and the AMLD have started working together on the 10 prioritised recommendations.

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- Ms. Mariam Maiga

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- Mr. I. Berthé, CPS
- Mr. S. Traoré, DAF
- Mr. Y. Berthé, DAF
- Mr. Touré, Ministry of Finance
- Mr. M. Touré, Ministry of Commerce
- Dr. R. Ba, District Health Directorate Bamako
- The Regional Directorates of:
 - Sikasso
 - Timbuktu
- Dr. A. Nientao, Gabriel Touré Hospital
- Dr. A. Sidibé, Point G Hospital
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 - CSCOM Hippodrome
 - CSREF Commune I
 - CSREF Commune V
 - Gabriel Touré Hospital
 - Point G Hospital
 - CSREF Sikasso
 - Sikasso Regional Hospital

- CSREF Kadiolo
- CSREF Timbuktu
- Regional Hospital Timbuktu
- CSREF Doeuntza
- The MRPPMs of:
 - Mopti
 - Sikasso
 - Timbuktu
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Appendix 1 – List of Abbreviations

AMLD	Association Malienne de Lutte Contre le Diabète (Diabetes Association)
CIF	Cost, Insurance, Freight (INCOTERM meaning that the insurance and delivery of goods to the destination is paid for by the supplier. Buyer is responsible for the import customs clearance and other costs and risks.)
CPS	Cellule de Planification et de Statistique
CSCOM	Centre de Santé Communautaire (Community Health Centre)
CSREF	Centre de Santé de Référence (Referral Health Centre)
DAF	Direction Administrative et Financière
DMT	Département de Médecine Traditionnelle (Traditional Medicine Department of the Ministry of Health)
DNS	Direction Nationale de la Santé (National Health Directorate)
DNS NCD	Direction Nationale de la Santé – Non Communicable Disease Programme
DPM	Département de la Pharmacie et du Médicament (Pharmacy and Medicines Department of the Ministry of Health)
DRC	Dépôt Répartiteur de Cercle (Cercle Medical Depository)
DRS	Direction Regionale de la Santé (Regional Health Directorate)
FEMAT	Fédération Malienne des Tradithérapeutes (Malian Federation of Traditional Healers)
GDP	Gross Domestic Product
HIPC	Highly Indebted Poor Country
IDDM	Insulin Dependent Diabetes Mellitus
IDF	International Diabetes Federation
IIF	International Insulin Foundation
LDC	Less Developed Country
MoC	Ministry of Commerce
MoF	Ministry of Finance
MoH	Ministry of Health
MRPPM	Magasin Régional de la Pharmacie Populaire du Mali (Regional Central Medical Stores)
NCD	Non Communicable Disease
NIDDM	Non-Insulin Dependent Diabetes Mellitus
PPM	Pharmacie Populaire du Mali (Central Medical Stores)
RAPIA	Rapid Assessment Protocol for Insulin Access
SDM	Santé Diabète Mali
VAT	Value Added Tax
WHO	World Health Organisation

Appendix 2 – Insulin and diabetes in developing countries

Insulin

Insulin is the body's 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 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.

Type 1 diabetes and insulin in developing countries

Leonard Thompson, a Canadian child, was given his first injection of insulin on 11 January 1922¹⁵. 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 Type 1 diabetic patients in the pre-insulin era.

The IDF estimates that in Africa there are approximately 108,000 people with Type 1 diabetes.¹¹ With the restricted availability of insulin, the life expectancy of a child with newly diagnosed Type 1 diabetes in much of sub-Saharan Africa may be as short as one year. Restricted access to insulin also results in debilitating complications such as amputations, blindness and a much reduced life expectancy.

Restricted access to insulin in sub-Saharan Africa is not only due to lack of availability, but also cost. Chale and McLarty¹⁶ found that the annual direct cost for an insulin requiring patient was equivalent to US\$229 (€ 176, CFA 118,850), with almost 70% of this amount for the purchase of insulin.

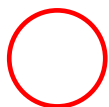
Incidence and Prevalence of Diabetes

Incidence is the measure of how many people within a certain population will get a disease within a certain time. The incidence of diabetes in children varies greatly from country to country. For Mali the incidence of Type 1 diabetes is estimated by the IDF as 1 per 100,000 each year¹¹. This estimate is based on a study by Olatunbosun et al.¹⁷ in Nigeria. With around 4 million children aged under 15 in Mali, this would mean that 40 new cases develop in the country each year.

The prevalence is the proportion of a population at a given time that has a certain disease. For a lifelong condition like diabetes this will depend, as well as on the incidence, on how long someone with the condition survives after being affected. Before the discovery of insulin the prevalence of Type 1 diabetes was very low, although the incidence may have been high. This is because new cases of diabetes were dying very soon after disease onset, as there was no appropriate treatment for them. In developing countries, the incidence is difficult to assess, as survival may be very short, and many people will die undiagnosed.

One other factor which comes into play is whether patients developing the disease are diagnosed. In some parts of the developing world, patients with weight loss, fatigue and other symptoms of Type 1 diabetes may be misdiagnosed, for example, with AIDS, or those presenting in diabetic coma as having malaria. This will artificially lower estimates of incidence.

Appendix 3 – Map of the Republic of Mali



Areas of study:

- Bamako (District)
- Sikasso (Town) and Kadiolo (Cercle)
- Timbuktu (Town)
- Doeuntza (Cercle)

Appendix 4 - Numbers of interviews and discussions for the RAPIA in Mali

Area	Patient	Pharmacy	Healthcare worker	Traditional Healers	Health Facilities	Regional level	National level
Bamako	18	11	12	10	8	1	20
Sikasso and Kadiolo	11	6	7	8	5	5	
Timbuktu and Douentza	10	3	5	2	3	5	
Total	39	20	24	20	16	11	20

Appendix 5 – Proportion of people with diabetes present in each region based on IDF estimates

Location	Number of people with Type 1 diabetes	Number of people with Type 1 diabetes based on IDF estimate	Proportion present based on IDF estimate
Bamako	310	82	378%
Sikasso	34	144	24%
Timbuktu	13	38	34%
Total	453	790	57%

Appendix 6 – Insulin supply in Mali

The public sector should receive its supplies from the Pharmacie Populaire du Mali (PPM, Central Medical Stores) based in Bamako. The PPM supplies generics to all levels of the public and private health sectors. There are Regional Medical Stores (MRPPM) that act as relays between the PPM and the Cercle Depositories (DRC). The DRCs serve the CSREF and therefore should have insulin present. However, this is not the case.

Figure 6 – Theoretical Pathway of Insulin in Mali

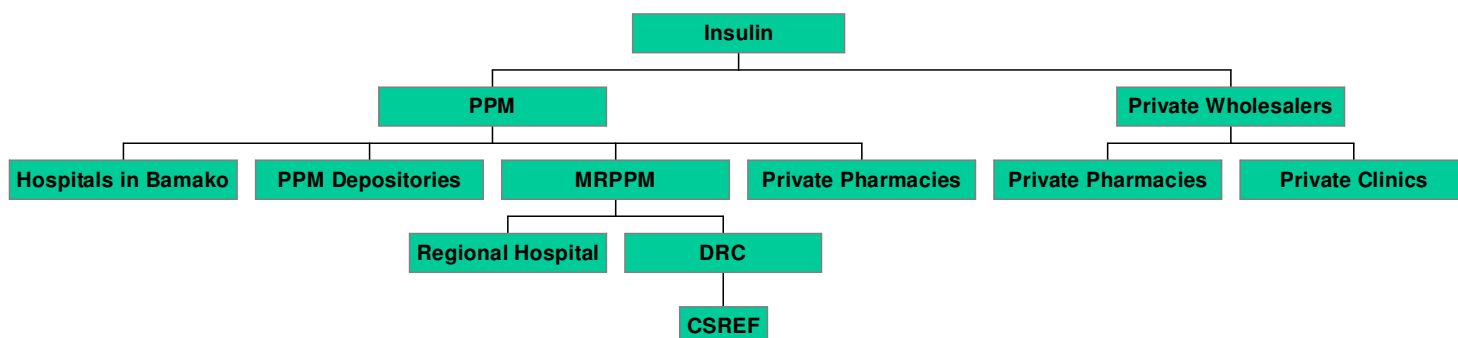
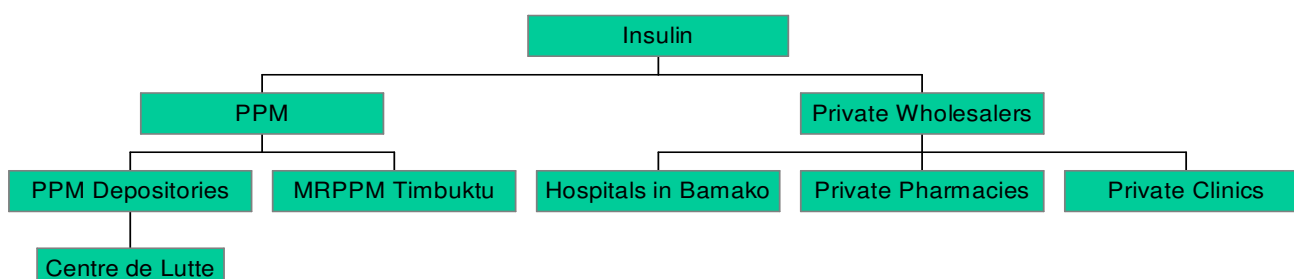


Figure 7 – Actual Pathway of Insulin in Mali as observed during the RAPIA



Drug requirements expressed at lower levels of the health system and filter up to the PPM. The PPM then ships out the medicines according to orders. However at the time of the RAPIA, no orders for insulin had been made from public facilities as for the past 3 years the PPM did not stock insulin.

According to some people interviewed during the study from 60-90% of needs in generic medicines were covered by the PPM. The remainder was made up through purchases with private wholesalers. The main problem with PPM that was highlighted was that orders made by MRPPMs were often not fulfilled. The reason for this is that the PPM often is unable to order the quantities necessary to meet the needs expressed. The MRPPMs then receive a proportion of the total amount they have ordered or some medicines missing altogether. This means that not enough medicines are present at a regional level, which impacts each level below. At no time are facilities warned of what medicines are and are not available at the higher echelons. Some managers of MRPPMs or DRCs take the initiative to inform their customers what medicines are available, but this is not systematic.

A different arrangement exists for social diseases (Leprosy, Tuberculosis and HIV/AIDS) where the medicines are organised at a central level by the Direction Nationale de la Santé (DNS). The DNS sends the medicines to the Direction Regionale de la Santé (DRS) and they are then distributed to CSREF. The quantification of requirements for these medicines is done at the CSREF, then at the DRS and finally the DNS the quantity of medicines that need to be ordered by the PPM. These medicines are provided to the population free of charge.

Appendix 7 – Quantity of Insulin ordered in Mali

Region	Insulatard 100 IU	Actrapid 100 IU	Other	Total
Bamako	7,172	367	260	7,799
Sikasso	503	43	16	562
Timbuktu	137	50	0	187
Total for Mali				15,005

Other types of insulin include: 40 IU Actrapid and Insulatard, Mixtard and Monotard.

Appendix 8 – Distribution of Insulin throughout Mali

Region	Total	Proportion population	Proportion Insulin
Bamako	7,799	10%	52%
Sikasso	562	18%	4%
Timbuktu	187	5%	1%
Total for Mali	15,005		

Appendix 9 – A comparison of Purchase and Selling Price in different facilities in Mali

Pharmacy	Purchase Price	Selling Price to Patients	Percentage Mark-up
PPM Initiative de Bamako	CFA 4,230 (€ 6.44)	CFA 5,200 (€ 7.91)	23%
PPM Timbuktu	CFA 4,230 (€ 6.44)	CFA 5,390 (€ 8.20)	27%
Private Sector (Bamako, Sikasso, Kadiolo)	CFA 4,582 (€ 6.97)	CFA 6,110 (€ 9.30)	33%
Private Sector (Timbuktu)	CFA 4,582 (€ 6.97)	CFA 6,210 (€ 9.45)	36%
Centre de Lutte	CFA 4,230 (€ 6.44)	CFA 4,500 (€ 6.85)	6%
Gabriel Toure Hospital	CFA 5,449 (€ 8.29)	CFA 6,100 (€ 6.44)	12%
Point G Hospital	CFA 4,582 (€ 6.97)	CFA 6,000 (€ 9.13)	31%
Average	CFA 4,555 (€ 6.93)	CFA 5,644 (€ 8.59)	24%

Appendix 10 – Patient pathway in Bamako

Patient		Patient		Patient
↓		↓		↓
CSCOM		CSREF		Centre de Lutte Gabriel Touré Hospital Point G Hospital
- If unable to diagnose refer to CSREF for blood glucose - Or if unable to determine cause of ailment refer to CSREF	→	- Once diagnosis established referred - Or if unable to determine cause of ailment refer to Hospitals - CSREF have Glucometers and/or Spectrophotometers	→	- Diagnosis - Treatment regimen - Follow-up - Treatment of complications (all 3 facilities can hospitalise patients, only amputations and other serious complications are dealt with at hospitals)
- 50% of CSCOM have glucometer Diagnosis made refer directly to Centre de Lutte, Gabriel Touré Hospital or Point G Hospital			→	

Appendix 11 – Patient pathway in Sikasso

Patient		Patient		Patient
↓		↓		↓
CSCOM		CSREF		Regional Hospital
<ul style="list-style-type: none"> - Unable to diagnose refer to CSREF or Hospital directly 	→	<ul style="list-style-type: none"> - CSREF has Glucometer. Once diagnosis is done patient is referred to either: - Doctor “specialised” in diabetes - Nurse who has received training in diabetes - They are able to: <ul style="list-style-type: none"> - Diagnose - Establish treatment regimen - Follow-up patients - For any complicated cases or complications referred to Bamako 		<ul style="list-style-type: none"> - Diagnosis - Treatment regimen - Follow-up - Treatment of complications - This is done by doctor who has initial consultation with patient - For any complicated cases or complications referred to Bamako
		↓		↓
<p>Bamako Centre de Lutte Gabriel Touré Hospital Point G Hospital</p> <ul style="list-style-type: none"> - Patients then sent back with new treatment regimen for follow-up - Some patients decide to continue having their care only in Bamako 				

Appendix 12 – Patient pathway in Timbuktu

Patient		Patient		Patient
↓		↓		↓
CSCOM		CSREF		Regional Hospital
<ul style="list-style-type: none"> - Unable to diagnose refer to CSREF or Hospital directly 	→	<ul style="list-style-type: none"> - CSREF has Glucometer and Spectrophotometer once diagnosis is done patient is cared for by one of two doctors - They are able to: <ul style="list-style-type: none"> - Diagnose - Establish a treatment regimen - Follow-up - For any complicated cases or complications referred to Bamako 		<ul style="list-style-type: none"> - Diagnosis - Treatment regimen - Follow-up - Treatment of complications - This is done by doctor who has initial consultation with patient - For any complicated cases or complications referred to Bamako
		↓		↓
<p>Bamako Centre de Lutte Gabriel Touré Hospital Point G Hospital</p> <ul style="list-style-type: none"> - Patients then sent back with new treatment regimen for follow-up - Some patients decide to continue having their care only in Bamako 				

Appendix 13 – Cost of Blood or Urine Glucose tests in different areas of Mali

Region	Cost Blood Glucose	Cost Urine Glucose
Bamako Average	CFA 1,314 (€ 2)	CFA 706 (€ 1.07)
Douentza Average	CFA 1,000 (€ 1.52)	CFA 200 (€ 0.3)
Kadiolo Average	CFA 1,000 (€ 1.52)	CFA 300 (€ 0.46)
Kati Average	CFA 1,000 (€ 1.52)	CFA 200 (€ 0.30)
Sikasso Average	CFA 950 (€ 1.45)	CFA 275 (€ 0.42)
Timbuktu Average	CFA 1,500 (€ 2.28)	CFA 500 (€ 0.76)
Overall Average	CFA 1,188 (€ 1.81)	CFA 446 (€ 0.68)