

# **REPORT ON THE RAPID ASSESSMENT PROTOCOL FOR INSULIN ACCESS IN NICARAGUA**

**January – March 2007**



**Prepared by:**

David Beran, Project Coordinator, International Insulin Foundation  
Dr. Catherine Atlan-Corea, Consultant, Handicap International Nicaragua  
Dr. Brenda Tapia, Technical Coordinator, Handicap International Nicaragua  
Ana-Julia Martinez, Responsible Health Component, Handicap International Nicaragua

## **Table of Contents**

<b>List of Figures</b>	<b>4</b>
<b>List of Tables</b>	<b>4</b>
<b>Acronyms</b>	<b>5</b>
<b>1. Executive Summary</b>	<b>6</b>
<i>1.1. Key Findings</i>	6
<i>1.2. Recommendations</i>	7
<b>2. Background Information</b>	<b>9</b>
<i>2.1. Diabetes</i>	9
<i>2.2. Insulin</i>	10
<i>2.3. Diabetes in Latin America</i>	11
<i>2.4. International Insulin Foundation</i>	12
<i>2.5. Handicap International</i>	12
<i>2.6. Rapid Assessment Protocol for Insulin Access (RAPIA) – method of assessment</i>	13
<i>2.7. Nicaragua</i>	14
<i>2.8. Nicaragua's healthcare system</i>	14
<i>2.9. Implementation of RAPIA in Nicaragua</i>	19
<b>3. Type 1 and Type 2 Diabetes in Nicaragua</b>	<b>19</b>
<i>3.1. Prevalence</i>	19
<i>3.2. Mortality</i>	21
<i>3.3. Morbidity</i>	21
<i>3.4. Estimates</i>	23
<i>3.5. Costs</i>	25
<b>4. Nicaragua's medicine supply</b>	<b>25</b>
<b>5. Nicaragua's insulin and oral medications supply, quantification and price</b>	<b>28</b>
<b>6. Access to Syringes</b>	<b>36</b>
<b>7. Diabetes Care</b>	<b>38</b>
<i>7.1 Managua</i>	41
<i>7.2 Esteli</i>	42
<i>7.3 Pueblo Nuevo</i>	43
<b>8. Diagnostic tools and infrastructure</b>	<b>43</b>

<b>9. Healthcare workers and training</b>	<b>45</b>
<b>10. Chronic patient clubs and community involvement</b>	<b>46</b>
<b>11. Patient education</b>	<b>48</b>
<b>12. Adherence issues</b>	<b>48</b>
<b>13. Policy Framework</b>	<b>49</b>
<b>14. Prevention</b>	<b>49</b>
<b>15. Registers and patient data</b>	<b>50</b>
<b>16. Traditional Healers</b>	<b>51</b>
<b>17. Other Issues</b>	<b>51</b>
<b>18. Discussion</b>	<b>51</b>
<b>19. Recommendations</b>	<b>53</b>
<b>Appendices</b>	<b>62</b>
<b>References</b>	<b>70</b>

## List of Figures

Figure 1 – Organisation of the health system in Nicaragua	16
Figure 2 – Graph of Nurses and Doctors per 100,000 population in Nicaragua	18
Figure 3 – Graph of prevalence per 100,000 population aged above 20 years of age at the Primary level of attention in the different regions of Nicaragua	20
Figure 4 – Case fatality rate for Insulin and Non-insulin dependent diabetes by age group	21
Figure 5 – Total number of hospital registered deaths for diabetes 2000-2006 in the public sector	22
Figure 6 – Diagram of public supply of medicines	26
Figure 7 – Price control of medicines in private sector in Nicaragua	27
Figure 8 – Graph of Number of people with diabetes, Total insulin-requiring diabetes (calculated), Vials NPH (CIPS) and Total insulin-requiring diabetes (Assuming 13 vials per year)	35
Figure 9 – Average purchasing prices for a vial of NPH insulin in Nicaragua	36
Figure 10 – Ratio of syringes to vials of NPH insulin	37
Figure 11 – Path of a person with Type 2 diabetes in Managua	41
Figure 12 – Path of a person with Type 1 diabetes in Managua	42
Figure 13 – Path of a person with Type 2 diabetes in Esteli	42
Figure 14 – Path of a person with Type 1 diabetes in Esteli	43
Figure 15 – Number of strips for glucometers per 100,000 population	44
Figure 16 – Surveillance system in Nicaragua	50
Figure 17 – Map of Nicaragua(44)	62
Figure 18 – Poverty Map of Nicaragua	63

## List of Tables

Table 1 – Health Expenditure in Nicaragua(25) from 2003	16
Table 2 – Geographic access to health facilities in Nicaragua(28)	17
Table 3 – Human resources in Nicaragua	17
Table 4 – Specialists present in Nicaragua	18
Table 5 – Estimated prevalence of Type 2 diabetes in Nicaragua for 2007 and 2025(5)	20
Table 6 – Prevalence of Diabetes and Obesity in Managua (2004)	20
Table 7 – Calculations with regards to diabetes in Nicaragua	24
Table 8 – Estimated total direct and indirect costs of diabetes, per capita health expenditure and excess of cost of diabetes for Nicaragua(7)	25
Table 9 – Distribution of pharmacies throughout Nicaragua	27
Table 10 – Cost per patient per year	30
Table 11 – Reported difficulties with regards to access to insulin and medicines	31
Table 12 – NPH insulin data per region	32
Table 13 – Rapid insulin data per region	32
Table 14 – Comparison reported cases of diabetes and insulin ordered	33
Table 15 – Reported difficulties with regards to access to syringes	37
Table 16 – Percentage of people who have had the following exams done	39
Table 17 – Average waiting and consultation times	40
Table 18 – Presence of different diagnostic tools in health facilities visited	44
Table 19 – Population by age for both sexes in 2005	64
Table 20 – Dependency ratio	64
Table 21 – Percentage of population in different regions with no education	65
Table 22 – Number of interviews, meetings and discussions for the RAPIA in Nicaragua	65

## List of Appendices

<b>Appendix 1 – Map of Nicaragua</b>	<b>62</b>
<b>Appendix 2 – Poverty Map of Nicaragua(45)</b>	<b>63</b>
<b>Appendix 3 – Nicaragua basic statistics</b>	<b>64</b>
<b>Appendix 4 – Number of interviews and meetings for the RAPIA in Nicaragua</b>	<b>65</b>
<b>Appendix 5 – Details of calculations for Table 7</b>	<b>66</b>
<b>Appendix 6 – List of registered types of insulin in Nicaragua</b>	<b>67</b>
<b>Appendix 7 – MINSA Diabetes Protocol</b>	<b>68</b>
<b>Appendix 8 – Priority themes for education session in Chronic Clubs</b>	<b>69</b>

## Acronyms

ADA	American Diabetes Association
APNJDN	Asociacion de Padres de Ninos y Jovenes Diabeticos de Nicaragua (Association of parents with children and adolescents with diabetes)
CIPS	Centro de Insumos Para la Salud (Centre for health supplies, Central Medical Stores)
DOTA	Declaration of the Americas of Diabetes on Diabetes
FND	Fundacion Nicaraguense par la Diabetes (Nicaraguan Foundation for Diabetes)
FUNDPEC	Fundacion Por Ayuda a Enfermos Cronicos (Foundation to assist patients with chronic diseases)
GDP	Gross Domestic Product
HI	Handicap International
HIPC	Highly Indebted Poor Country
IDDM	Insulin Dependent Diabetes Mellitus
IDF	International Diabetes Federation
IIF	International Insulin Foundation
INSS	Instituto Nicaraguense de Seguridad Social (Nicaraguan Social Security Institute)
MAIS	Modelo de Atencion Integral en Salud (Integrated Model for Health provision)
Mascota	“Hospital Infantil Manuel de Jesus Rivera” (National Paediatric Hospital located in Managua)
MINSA	Ministerio de Salud, Ministry of Health
NCD	Non Communicable Disease
NIDDM	Non Insulin Dependent Diabetes Mellitus
PAHO	Pan American Health Organization
PPP	Purchasing Power Parity
RAAN	Region Autonoma del Atlantico Norte (Northern Atlantic Autonomous Region RAAN)
RAAS	Region Autonoma del Atlantico Sur (Southern Atlantic Autonomous Region)
RAPIA	Rapid Assessment Protocol for Insulin Access
SILAIS	Sistemas Locales de Atencion Integral en Salud (Local Systems for Comprehensive Healthcare)
WHO	World Health Organization

## **1. Executive Summary**

The International Insulin Foundation in collaboration with Handicap International with the support of the Ministry of Health and Asociacion de Padres de Ninos y Jovenes Diabeticos de Nicaragua carried out the Rapid Assessment Protocol for Insulin Access in Nicaragua from 21 January to 31 March 2007. The aim of this assessment was to see what barriers to diabetes care and access to medicines were present, in order to develop specific programmes and projects to address these. This report should be viewed as the first step in improving the care for people with diabetes in Nicaragua.

### **1.1. Key Findings**

- **Supply of insulin and oral medications**
  - Insulin and other medicines for diabetes are provided for free by Public and Social Security facilities
  - Supply system works well
  - No reported or observed problems with cold chain
  - Some health facilities do not provide the full quantity of required medicines
  - Insulin is not always available at place where person has their consultation
  - Children need to go to the National Paediatric Hospital in Managua to get their insulin
  - Some health centres do not have Rapid insulin for outpatients
  - Access to other medicines for diabetes related complications and other conditions is sometimes difficult for people with diabetes in the public sector
  - Patients need to go to Health Centre every month to get medicines
- **Access to syringes**
  - Syringes are not readily available in the Public sector and need to be bought in private pharmacies
- **Diabetes Care**
  - There is no specialised care for children with Type 1 diabetes outside of Managua
  - Guidelines for the management of Type 1 and Type 2 diabetes exist
    - However, they are very ambitious and not necessarily adapted to the reality of Nicaragua
  - Presence of chronic clinics and diabetes consultations at the level of Health Centres
  - Lack of standardised care within and between health facilities, except for the Mascota Paediatric Hospital
  - Large number of patients at Health Centres for each consultation
  - Access to specialists in rural areas is difficult and transportation costs are often a barrier
  - Long waiting times and problems accessing specialists and internists at hospital
  - Problems with counter-referrals
- **Diagnostic tools and infrastructure**
  - Diagnosis and follow-up are mainly done with glucometers (capillary blood glucose measurements)
  - Problems with regards to availability and supply of testing strips and reagents for public facilities
  - Problems with availability of tools necessary for proper diabetes check-up
  - National referral laboratory's capabilities with regards to HbA1c are under utilised
  - High cost for patients of self-monitoring equipment
- **Healthcare workers and training**

- Lack of training for doctors, nurses, laboratory technicians and other related health professionals in diabetes and also patient education and management of long-term conditions
- Under utilisation of nurses
- Lack of specialised resources
- **Chronic patient clubs and community involvement**
  - Community involvement is extremely important in Nicaragua
  - Extremely strong association for children
  - Chronic patient clubs are present in many facilities and are at different stages of development
  - Some patients view voluntary contribution to club as a payment for healthcare
  - No National voice for diabetes in Nicaragua
- **Patient education**
  - Not standardised, will vary from facility to facility
  - No standardised tools or materials
- **Adherence**
  - Problems with regards to adherence to dietary and lifestyle recommendations
  - Self-medication
- **Policy framework**
  - Lack of a concrete, strong and overarching policy on diabetes
- **Prevention**
  - Currently no prevention programme for:
    - Primary prevention
    - Secondary prevention
- **Registers and patient data**
  - A lack of complete data with regards to diabetes exists
  - Registers and patient records were kept in all facilities, but amalgamation of this data is poor
  - Surveillance system does not include diabetes
  - Use of the term Type 1 diabetes is often confused with people requiring insulin

## 1.2. Recommendations

Each of these recommendations cannot be implemented in isolation. For example, an increase in awareness of diabetes through a prevention campaign will inevitably lead to an increase in numbers of people diagnosed, which will have ramifications on the number of people attending consultations and needing diagnostic tools and medication. These recommendations are specific to diabetes, however for feasibility and rational use of scarce resources in Nicaragua, these can and should be applied to all Non Communicable Diseases in both the Public and Social Security sectors. It should be noted that there are many examples from other Latin American countries that can be used as models for different aspects of implementing these recommendations. The Pan American Health Organization, International Diabetes Federation South and Central America Region and the Asociacion Latinoamericana de Diabetes have much experience that can assist Nicaragua in developing different aspects of its programme with regards to diabetes.

- **Supply of insulin and oral medications**
  - Rapid insulin present at Health Centres when needed
  - Investigate the feasibility of having MINSA and CIPS manage the supplies for INSS with regards to diabetes
  - Development of a basic package of medicines necessary for diabetes and related complications

- Ensure that after children and pregnant women people with diabetes are given priority access to other medicines
- Ensure that all health facilities fulfil the full prescription for diabetes, especially with regards to insulin
- Register each child in Health Centre of origin in order for them to be able to get insulin at Health Centre in their Municipality
- **Access to syringes**
  - Link supply of syringes with insulin
- **Diabetes Care**
  - Inclusion of Type 1 diabetes in chronic disease focal point's training
  - Focal point for chronic conditions responsible for children with Type 1 diabetes in each Municipality
  - Organisation of 1-2 yearly check-ups in Managua for all children with Type 1 diabetes covering the price of transportation
  - Updating and standardisation of guidelines adapted with reality of the situation in Nicaragua
  - Distribution and training with regards to these guidelines
  - Development of a standardised checklist for each consultation adapted and achievable for level of the health system
  - Increase number of days of consultation
  - Increase role of nurse for patients with no complications
  - Ensure that hospital consultations are only used for specialised care and not routine care
  - Improve counter-referrals
  - Organise yearly "diabetes" day(s) consultations at each Regional Hospital
- **Diagnostic tools and infrastructure**
  - Improve supply mechanisms for strips and reagents
  - Ensure all health units have necessary diagnostic and clinical tools
    - Development of an adapted diabetes toolkit to be present at each level of the health system
  - Investigate feasibility of regular HbA1c checks for the largest number of patients possible
  - Ensure that types of glucometers present in the Public sector are limited in order to limit the number of types of strips that need to be purchased, standardised and safe for multiple patient use
- **Healthcare workers and training**
  - Train chronic disease focal point in Type 1 and Type 2 diabetes
  - Develop training material for nurses, laboratory technicians and other health professionals
  - Training for healthcare workers on how to teach patients and management of long-term conditions
- **Chronic clubs and community involvement**
  - Train members of clubs to be peer educators
  - Develop role of clubs as support group
  - Develop role of clubs as pressure groups for Municipal and Regional governments
  - Increase organisational capacity
  - Creation of National Council on Diabetes
- **Patient education**



- Development of tools adapted to the socio-economic situation in Nicaragua that are easy to use and understand and culturally adapted
- Organise education activities during consultation waiting times
- **Adherence**
  - Improve patient education
  - Development of dietary guidelines adapted to Nicaragua
  - Improve access to medicines so that patients do not need to go to Health Centre every month
- **Policy framework**
  - Development of a policy in line with the United Nations' Resolution on diabetes
- **Prevention**
  - Develop primary prevention programme
    - Increased collaboration with PAHO's CARMEN and "Get moving America"
    - School and community focus
    - Development of policy
    - Involve Brigadistas and community health workers
  - Develop secondary prevention programme
    - Increase training for healthcare workers
    - Increase patient education
    - Yearly specialised consultations for patients
- **Registers and patient data**
  - Improve training for people responsible for statistics and surveillance with regards to diabetes and surveillance of Non Communicable Diseases
  - Inclusion of diabetes in surveillance system
  - Identify ways for surveillance system to notify patient numbers and not episodes or consultations
  - Development of standardised tool for data collection with regards to diabetes
  - Creation of a register of children with diabetes in each municipality
  - Use data to feed into planning for consultations, medicines, etc.

## **2. Background Information**

### **2.1. 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).

In Type 2 diabetes the pancreas does not produce enough insulin or peripheral organs do not use the insulin properly. Type 2 is closely linked with a sedentary lifestyle and obesity. This form of diabetes once referred to as adult onset diabetes, as it appeared in people above the age of 40, has now been found to occur in extremely obese children and young adults. 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.

Insulin is vital for the survival of people suffering from Type 1 diabetes and in some people suffering from Type 2 (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 to 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).

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.

Type 2 diabetes is currently a major global Public Health concern. “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.”(1) On the 20<sup>th</sup> 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”.(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 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.

Insulin can be produced through the extraction and purification of animal pancreas’ or nowadays through bioengineering. Insulin comes in different formulations, which differ based on the following three criteria:

- Onset: the time it takes for the insulin once injected to start its pharmacological effect of lowering blood glucose
- Peak: the length of time after administration that it takes the insulin to reach its maximum effectiveness
- Duration: the length of time that the insulin remains active

By different chemical preparation or genetic engineering, four basic types of insulin with their respective onset, peak and duration, 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.(3)

### **2.3. Diabetes in Latin America**

The incidence of Type 1 diabetes in Latin America ranges from 0.4 to 8.3 cases per 100,000 children under 15 years of age.(4) The International Diabetes Federation estimates that there are 40,400 children aged 0-14 with Type 1 diabetes in South and Central America.(5) A study by Carrasco et al.(6) found that the incidence of Type 1 diabetes was 4.02 per 100,000 in Santiago, Chile. It was reported that this rate had increased in the period from 1986 to 2003.

For Type 2 diabetes the range of prevalence is 1.2% to 8% with higher prevalence rates in urban populations.(4) Thirty five million people in the Latin America and the Caribbean currently have diabetes and it is forecast that this will increase to 64 million by 2025.(7) It is estimated that in 2003, diabetes was related to some 300,000 deaths in Latin America and the Caribbean, although official statistics link only some 70,000 deaths to the disease, annually.(8)

In parallel to urbanisation there is a decrease in the consumption of fruits, vegetables, whole grains, cereals, and legumes. This is coupled with a relatively high consumption of highly refined and processed foods rich in saturated fats, sugar and salt. This dietary pattern is described as the “nutritional transition”(9) and is one of the key elements causing the rising numbers of overweight and obese people in Latin America and the Caribbean.(8, 10) Population-based surveys from the region show that, in 2002, 50% to 60% of adults and 7% to 12% of children less than 5 years of age were overweight or obese.(11) In Chile and Mexico, the 2004 national surveys showed that 15% of adolescents were obese.(11)

In addition 30% to 60% of the population in Latin America and the Caribbean do not achieve the minimum recommended levels of physical activity.(12) There is also a shift in types of professional activities from manual labour and agriculture to the service sector.(13)

Leonard Thompson, a Canadian child, was given his first injection of insulin on 11 January 1922.(14) 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.

In many countries in Latin America people face many difficulties accessing and affording insulin.(15) This leads to debilitating complications such as amputations, blindness and a much reduced life expectancy.

The total cost of diabetes in 2000 for Latin America and the Caribbean was estimated to be US\$ 65 billion.(8)

The Declaration of the Americas on Diabetes (DOTA) recognises diabetes as a pandemic and calls for strategic action in the following areas:

- Diabetes education
- Awareness and advocacy
- Quality of care
- National diabetes program development

- Epidemiology and organizational alliances

The Pan American Health Organization (PAHO) recognises the declaration as a guide to national program development.(16) The PAHO strategy on chronic conditions call for the following 4 elements to be implemented:

- Surveillance
- Reorientation of health systems towards chronic conditions
- Essential role of health promotion
- Prevention

PAHO in 1995 developed the CARMEN concept for the prevention of Non Communicable Diseases (NCD). The purpose of the CARMEN program is to improve the health status of the population by reducing the prevalence of the risk factors associated with NCDs. This is attained through integrated health promotion and disease prevention at the community level and their health care services.(17) PAHO has also launched the “Get moving America” campaign against obesity. This programme includes a website with diets, news, advice etc. and is championed by a Latin American TV celebrity.(18)

#### **2.4. 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 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, 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).(19)

Past implementations of the RAPIA have lead to improved supplies of insulin, development of diabetes associations, improved education and development of NCD policies.

#### **2.5. Handicap International**

Handicap International (HI) is an international not for profit organisation specialised in the field of disability. Handicap International is non-governmental, with no religious or political links that has as its mandate to implement programmes in a sustainable manner.

HI works and advocates in order to improve the lives and community participation for people with disability. It has as its aim to strengthen the capacities of these populations in order for them to benefit from their basic needs and rights.

The organisation intervenes in any countries where its mission can have an impact, but particularly in developing countries where poverty accentuates situations of inequality and exclusion and in countries impacted by natural disasters and armed conflict.

HI acts in parallel to existing initiatives, in line with its values, to take into account the needs of the populations for which it works.

HI acts on behalf of people with deficiencies and/or physical, sensory, intellectual or psychological disabilities. This includes people with permanent and temporal disabilities, with chronic disabilities that need psychological support.

With a global focus on disability, Handicap International does not only provide support to the individual with a disability, but also their family and the community at large.

Since its creation HI has implemented development programmes in approximately 60 countries and has intervened in many emergency situations. The 8 national associations (Belgium, Canada, France, Germany, Luxemburg, Switzerland, United Kingdom and United States) work constantly to mobilise resources, jointly manage projects and promote the principles and actions of HI.

Present since 1997 in Central America, HI initiated its activities in Nicaragua in the Chontales region. In 2007, HI's Central American programme is present in Nicaragua (Managua, regional office, and Esteli), Honduras (Tegucigalpa) and has a collaboration with the Don Bosco University in El Salvador. In the region HI has 6 strategic aims to implement from 2007 to 2011:

- Inclusive education: Implemented in 4 departments of the Northern region of Nicaragua
- Health: Rehabilitation, early detection and stimulation, prevention of disability. This will be implemented in El Salvador and Nicaragua including the possibility of implementing a prevention programme with regards to diabetes in Esteli, Nicaragua.
- Workforce integration: Implemented in the Municipality of Esteli, Nicaragua.
- Emergency and disability
- Inclusive practices and policies: Implemented in Nicaragua and Honduras.
- Strengthening of associations of people with disability: Implemented in Nicaragua and Honduras.

## **2.6. Rapid Assessment Protocol for Insulin Access (RAPIA) – method of assessment**

The RAPIA(19) 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

The RAPIA is not a statistical assessment of the health system. 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.

## **2.7. Nicaragua**

Nicaragua is located in Central America between Honduras to the North and Costa Rica to the South. (See Map in Appendix 1) Its 5,142,098 people live in 15 Departments, 2 Autonomous Regions divided into 153 municipalities. Nicaragua is ranked 112 out of 177 on the United Nations Development Programme's Human Development Index<sup>1</sup>.(20)

Gross Domestic Product (GDP) per capita at Purchasing Power Parity (PPP) is estimated to be US\$ 2,900.(21) The lowest monthly wages in different areas of the economy vary from Cordobas 869.40 (US\$ 48.3) for the agricultural sector to Cordobas 2,018.40 (US\$ 112) for workers in construction and financial and insurance companies.(22) The basic consumer basket of goods is priced at Cordobas 3,046.37 (US\$ 169).(22)

The current urban population is estimated to be 58.3%, which will increase to 60% by the year 2015.(23) A national survey in 2001 estimated that 45.8% of the total population lived in poverty and 15.1% in extreme poverty.(24) Poverty in Nicaragua is mainly in rural areas where it is five times higher than in urban areas. (See Poverty Map in Appendix 2) It should be noted that the Atlantic coast of Nicaragua and its two autonomous regions are the most affected by poverty and lack of access to the rest of the country<sup>2</sup>. The rate of illiteracy in 2005 was 20.5% in those aged above 10 years of age. Rural illiteracy is 3 times higher than in urban areas. Life expectancy at birth in Nicaragua is 67 years for men and 71 years for women.(25)

Other statistics on Nicaragua are included in Appendix 3.

## **2.8. Nicaragua's healthcare system**

The main health determinant for Nicaraguans is poverty. 20% of children aged less than 5 years of age are chronically malnourished. Data from the Ministry of Health (MINSA) show that 9% of children are born with low birth weight.(26) Child mortality for all of Nicaragua is 11 per 100 children. This is not equally distributed through the country with Managua having a rate of 8.7 and Jinotega 14 per 100 children.(27)

Child mortality decreased from 79.8 per 1,000 in 1980-1985 to 35.5 per 1,000 in 2000-2005, as has maternal mortality from 125 per 100,000 to 96.6 per 100,000. The young and adolescents represent 25% of the total population. This population is characterised by early sexual activity and a high rate of pregnancy.(26)

The epidemiological transition<sup>3</sup> in Nicaragua is not homogeneous throughout the country due to different socio-economic factors in different regions of the country. In 2000 MINSA reported that the first cause of death was myocardial infarction (16.7%), followed by cerebrovascular disease (15.4%), perinatal mortality (11.5%) and diabetes (11.3%). In 2002 deaths due to chronic diseases represented 37% of the total.(23) Deaths due to communicable diseases fell from 14.5%

---

<sup>1</sup> A combined measure of a measure of income, education and health

<sup>2</sup> Unfortunately due to logistical constraints the RAPIA was not implemented in this region, but within the recommendations the special situation of this part of the country was included.

<sup>3</sup> Transition from a burden of disease being from communicable diseases to Non Communicable Diseases

in 1985 to less than 5% in 2002. For example in 2002 the prevalence of malaria, dengue and tuberculosis were respectively 14.4, 1.9 and 1.8 per 100,000 population.(23)

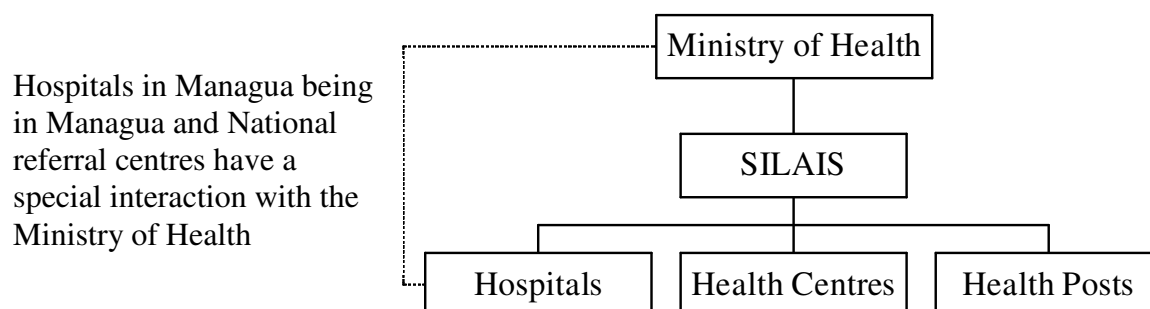
The Nicaraguan study on disability in 2003 found that chronic conditions were responsible for 67% of disability followed by 12.2% for accidents.(28)

In looking at causes of disability 67% of blindness in Nicaragua is related to chronic conditions and old age.(23) Other large health problems are mental health with 27.9% of the total population with a specific mental disability, 10.3% of the population over 6 years of age has some form of physical disability and 9% of deaths in women are due to cancer.

The role of MINSA is to “regulate, coordinate, organise, supervise and ensure the promotion, prevention, recovery and rehabilitation of health, delivered in a manner that is equitable, efficient, efficacious and of quality in the institutions that are part of the health system involving civil society for the benefit of the population of Nicaragua.”(26)

The health system is organised through a system called “Modelo de Atencion Integral en Salud” (MAIS, Integrated Model for Health Provision), which integrates 3 components: the provision, management and financing of health. It integrates inter and extrasectorial issues around health and the implementation of programmes in an equitable and efficient way for a specific geographic location and population. MAIS also determines the basic package of care in line with the policy of targeting specific priority populations. The basic package of services will be dependent on the financial resources available and the organisation of services. These services will be determined by each “Sistemas Locales de Atencion Integral en Salud” (SILAIS, Local Systems for Comprehensive Healthcare). These organisations represent MINSA with regards to administration and technical aspects at the level of the Departments.

**Figure 1 – Organisation of the health system in Nicaragua**



MINSA is also moving forward with a programme of decentralisation and giving more autonomy to hospitals in order to give them more flexibility to take decisions with regards to resource utilisation and how to best serve the populations they care for.

MINSA is planning to implement a new model for the provision of services in line with the epidemiology of the country and the needs of the population. In parallel there is the need to increase the number of people covered by the Social Security System including people employed in the informal sector of the economy. This will be done through novel ways of insurance and will act in accordance to the economic development of the country.(26)

The total 2006 budget for MINSA was Cordobas 3,282,690,516 (US\$ 182,371,695) or Cordobas 638 per person (US\$ 35).

The data below from the World Health Organization details the health expenditure in Nicaragua.

**Table 1 – Health Expenditure in Nicaragua(25) from 2003**

Total expenditure on health as percentage of GDP	7.7
External resources for health as percentage of total expenditure on health	11.2
Per capita total expenditure on health at average exchange rate (US\$)	60
Per capita total expenditure on health at international dollar rate	208
Per capita government expenditure on health at average exchange rate (US\$)	29
Per capita government expenditure on health at international dollar rate	101

Nicaragua's provision of care is comprised of a public, social security and private sector.

The Nicaraguan Social Security Institute (INSS) delivers medical services to beneficiaries via Medical Service Companies. It is funded through premiums determined by the INSS.(29) These are made up of a 6.25% of monthly salary worker contribution and 15% employer contribution. 8.5% of total income goes to health the remainder covers insurance, pension, etc. Only 6.3% of the population contributes to Social Security.(30) (Approximately 400,000 people, 22% of active population. If the person insured is male, his wife and children under the age of 12 are covered. If the person insured is female, only children under 12 are covered). INSS covers 872 conditions, 331 medicines, 197 surgeries and 105 exams.



INSS contracts medical providers to provide a basic basket of care, which includes medicines, laboratory tests and consultations. For this INSS pays each provider Cordobas 243 (US\$ 13.50) per capita per month. 42 medical care providers are contracted throughout Nicaragua. Of the 42, 23 are in Managua.

There are a total of 33 public hospitals in Nicaragua, with a total of 5,256 beds (102 beds per 100,000 population), 2,001 of these beds are located in Managua. 22 of these are general hospitals with the other being specialised in dermatology, psychiatry, gynaecology, oncology, paediatrics, etc.

The Primary level of care is comprised of 843 Health Posts and 177 Health Centres.(29) Nicaragua's Health Law states that at Health Centres, care for people with chronic diseases should be available.(31)

In terms of geographical access the table below shows the average travel time for people in urban and rural areas.

**Table 2 – Geographic access to health facilities in Nicaragua(29)**

Type of facility	Travel time in minutes	
	Urban	Rural
Health Post	27	35
Private Physician	44	103
Health Centres	46	78
Hospitals	53	111

Nicaragua as many developing countries faces a shortage of human resources. The table below shows the different human resources present in the public sector.

**Table 3 – Human resources in Nicaragua**

Description	Number	Per 100,000 population
Auxiliary nurses	3,881	75.5
General nurses	1,393	27.1
Specialised nurses	508	9.9
General nursing supervisor	145	2.8
General doctor	1,131	22.0
Specialised doctor	839	16.3
Sub-specialised doctor	162	3.2
Total doctors	2,132	41.5
Surgery technicians	462	9.0
Laboratory auxiliaries	185	3.6
Clinical laboratory technicians	305	5.9

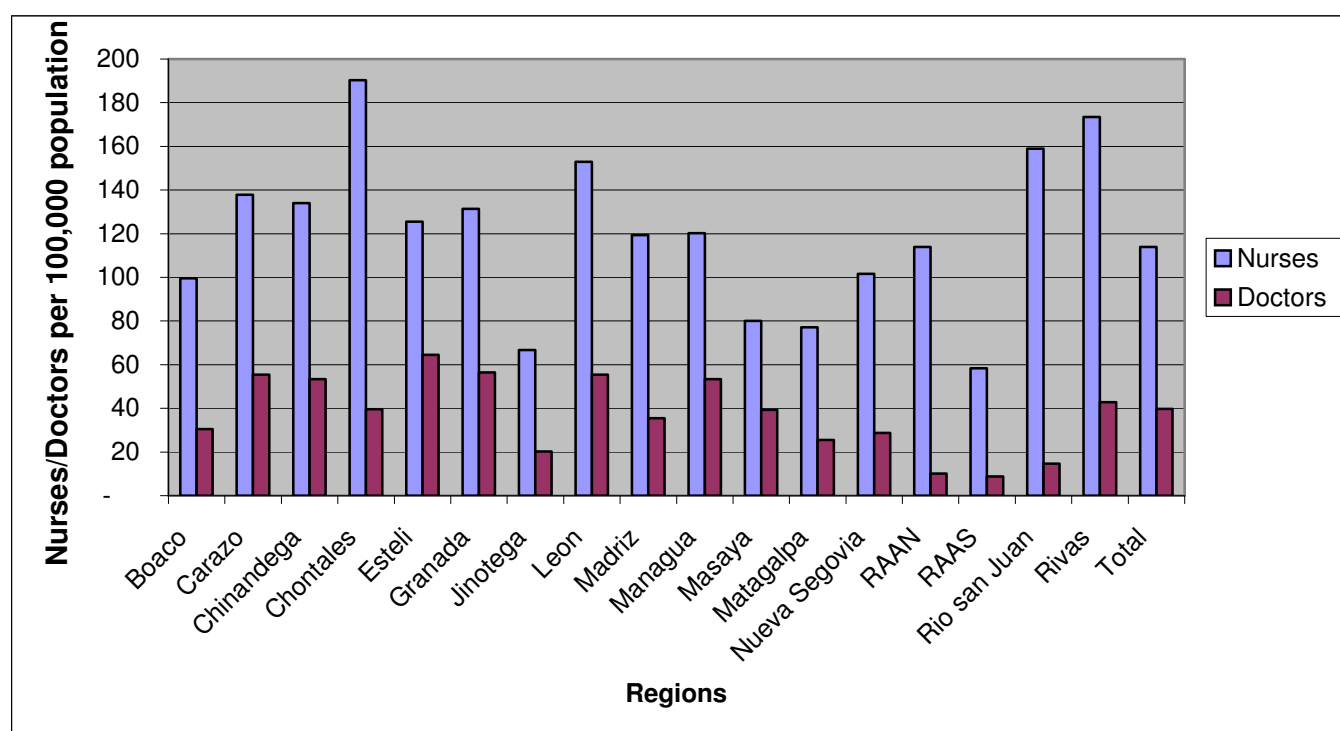
The following specialists are also present in Nicaragua.

**Table 4 – Specialists present in Nicaragua**

Description	Number	Per 1,000 population
Ophthalmologist	13	0.3
Doctor of Internal Medicine	95	1.8
Orthopaedist	71	1.4
Endocrinologist	6	0.1
Dermatologist	16	0.3
Nutritionist	32	0.6
Nutrition specialist	7	0.1
Nutrition Technician	40	0.8

There is an unequal distribution of these resources. The graph below shows the distribution of nurses and doctors throughout the country.

**Figure 2 – Graph of Nurses and Doctors per 100,000 population in Nicaragua**



Article 5 of the General Law on Health states that healthcare for vulnerable sectors of the population will be free. This includes diabetes care.(31)

Nicaragua faces many problems with lack of resources, both financial leading to lack of tools for diagnosis and treatment as well and human resources.

In addition to formal health care workers, Nicaragua has developed “Brigadistas”, or community health workers, who are volunteers with a role of being the extension of the health system within the community. They are involved in primary prevention, reporting of deaths and cases of disease within the community and vaccination campaigns.

## **2.9. Implementation of RAPIA in Nicaragua**

This was the first implementation of the RAPIA in Latin America. Nicaragua 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. In addition HI based on a pilot experience in Esteli and in line with its aim to strengthen its capacity in the prevention of disability was keen to initiate a diabetes complication prevention project in Esteli. In order to do this it was felt that it was necessary to carry out a clear evaluation of the situation.

Implementing the RAPIA in Nicaragua was to see how a sustainable solution could be found to the issues of access to insulin and proper diabetes care under extreme conditions of scarce resources in the health sector in a Latin American context and also identify possible projects for HI to implement. Past implementations of the RAPIA had focused mainly on access to insulin, during this implementation the assessment included access to oral medications for Type 2 diabetes as well.

The IIF’s Project Coordinator, David Beran in collaboration with Dr. Catherine Atlan-Corea, Consultant for HI Nicaragua, and coordinated by Dr. Brenda Tapia and Ana Julia Martinez from HI Nicaragua and a two teams of interviewers carried out the RAPIA in Managua, Esteli and Pueblo Nuevo. A total of 264 interviews, discussions and meetings were held. Appendix 4 shows a detailed table of all the interviews and meetings held.

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

It should be noted that all data presented below is based on a mix of statistics, perceptions and estimates. Any problems or conclusions generated from this data are for raising awareness and in no way can be used to remedy a problem.

## **3. Type 1 and Type 2 Diabetes in Nicaragua**

Diabetes is referred to locally as “azucar” (sugar) or “azucar en el sangre” (sugar in the blood).

### **3.1. Prevalence**

The IDF (International Diabetes Federation) estimates that there should be 1,300 cases of Type 1 diabetes in Nicaragua and an incidence rate of 1.5 per 100,000 children aged 0-14.(5) The APNJDN estimates that there are 360 children in all of Nicaragua with Type 1 diabetes.

The table below shows the IDF estimates with regards to the prevalence of Type 2 diabetes.

**Table 5 – Estimated prevalence of Type 2 diabetes in Nicaragua for 2007 and 2025(5)**

Year	Population (20-79) (000s)	Diabetes Prevalence	Rural	Urban	Male	Female	Total
2007	2,870	7.6	42.8	174.0	87.6	129.2	216.8
2025	4,686	9.4	63.2	378.5	178.7	263.0	441.7

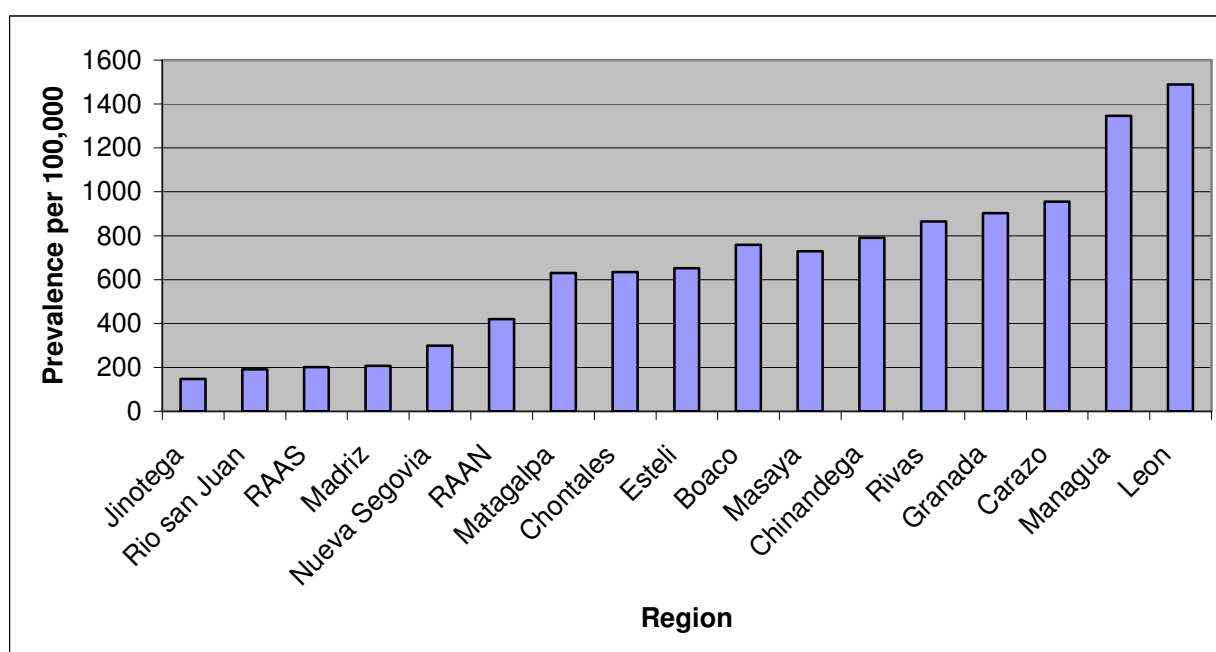
Table 6 shows the prevalence of diabetes and overweight in Managua for the population aged 20 years and more. This data is from 2004 and was presented during the Central American Diabetes Initiative (CAMDI) meeting in November 2006.(32)

**Table 6 – Prevalence of Diabetes and Obesity in Managua (2004)<sup>4</sup>**

	Crude			Standardised		
	Male %	Female %	Total %	Male %	Female %	Total %
Diabetes	8.93	9.02	8.98	11.63	12.03	11.91
Overweight <sup>5</sup>	59.04	71.40	65.61	63.08	74.40	69.19

Other data from MINSA from the Primary level of attention (Health Posts and Health Centres) shows that the overall prevalence of diabetes is 434 per 100,000. This number is extremely low, representing a prevalence of 1.4% in Managua compared to 9% from the CAMDI study. This may be partly explained by many patients not being captured using this system of data collection, a large proportion of undiagnosed people with diabetes or the people cared for by the private and Social Security sectors.

**Figure 3 – Graph of prevalence per 100,000 population aged above 20 years of age at the Primary level of attention in the different regions of Nicaragua**



<sup>4</sup> Sample size: 1,993

<sup>5</sup> Defined by BMI > 25

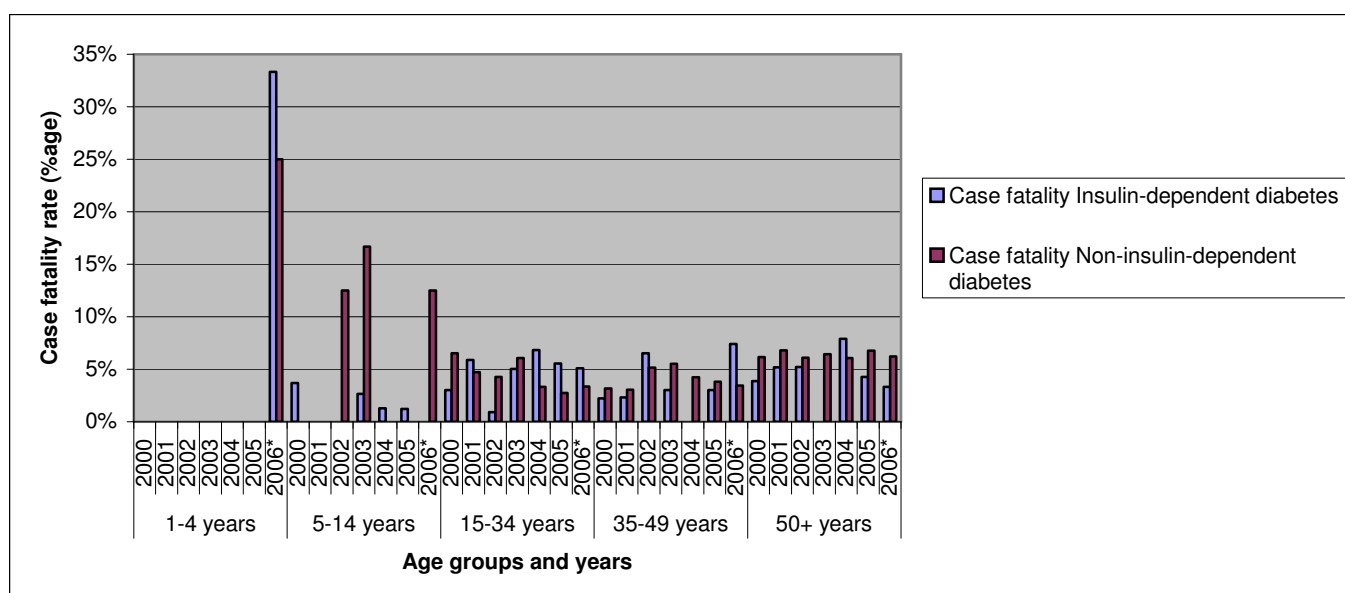
### 3.2. Mortality

The IDF also estimates that diabetes accounts for 10.4% of deaths in males aged 20-79 and 18.2% in females in the same age group.(5)

MINSa reports that diabetes is the second cause of death in Nicaragua. In looking at overall mortality statistics diabetes represents 1,085 reported deaths out of a total of 15,762 reported deaths or 7% of total deaths in 2006. This number of 15,762 reported deaths represents a mortality rate of 3 per 1,000, whereas data from the World Health Organization (WHO) shows that adult mortality in Nicaragua is 214 (men) and 151 (women) per 1,000 population. Other data from MINSa shows that diabetes causes 11.3% of deaths in Nicaragua in all age groups.(23)

The graph below shows the case fatality rate, what percentage of hospitalisations result in death.

**Figure 4 – Case fatality rate for Insulin and Non-insulin dependent diabetes by age group**



Except for those aged under 14 years of age, the case fatality rate remains relatively constant at around 5%.

### 3.3. Morbidity

In 2002 6.4% of all reported hospital admissions in the public sector had as their cause a chronic condition (17,804 hospital admissions). Diabetes accounted for 24% of these. These were not equally distributed throughout the country with 3.6% in Managua, 10.7% in Leon, 9.1% in Chinandega, 6.8% in Masaya, 5.6% in Granada, 5.1% in Esteli and 4.4% in Carazo.(23)

With regards to hospital admissions diabetes in 2004 and 2005 diabetes was the 10<sup>th</sup> cause for hospital admissions in Nicaragua. In 2006 it became the 9<sup>th</sup> cause. From 2000-2006 the number of hospitalisations for diabetes increased by 54%. The graph below shows the number of hospital admissions for diabetes from 2000-2006. The data for 2006 is extrapolated, as only the first 10 months were available from the Statistics office at MINSa. This was done by taking the first 10 months and assuming the number of hospitalisations would be constant for the remaining

2 months of the year.<sup>6</sup> This data is presented using the MINSA terminology used of Insulin-dependent and Non-insulin-dependent diabetes.

**Figure 5 – Total number of hospital registered deaths for diabetes 2000-2006 in the public sector**

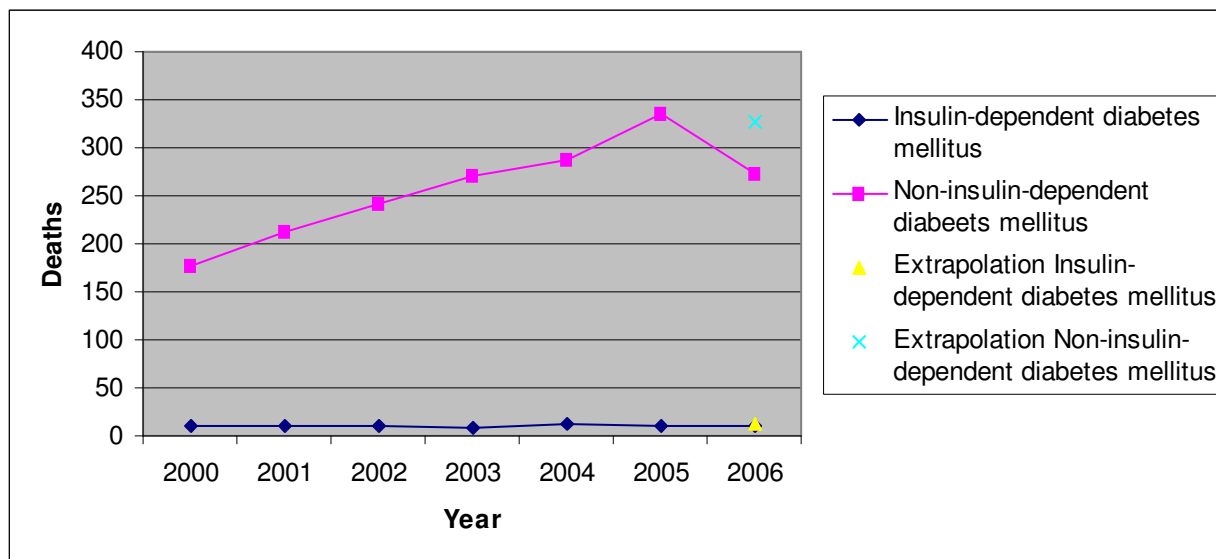


Figure 5 shows a steady increase for deaths in deaths related to Non-insulin dependent diabetes. For Insulin-dependent the total deaths remained constant.

The Statistics Department of MINSA, reports that diabetes is the 4<sup>th</sup> cause of consultation, not including any consultation for pregnancies, representing 2.1% of total consultations, after pneumonia (6.8%), diarrhoea and gastroenteritis (4.0%) and appendicitis (2.3%).

In looking at the example of an urban Health Centre in Managua, there were a total of 2,230 cases of diabetes (total population served by Health Centre: 62,519, with population 15+ representing 68.2% of total population). In 2006 there were a total of 6,346 consultations for diabetes (2.8 consultations per person) representing 2.4% of all consultations, or 4.3% of consultations of people attending the Health Centre aged over 15 years of age.

In looking at statistics from the INSS, unfortunately the collection of their data does not allow for number of people with diabetes to be calculated. The data they collect uses the sub-section from the International Classification of Diseases (ICD) E00-E87, Endocrine, nutritional and metabolic diseases. These conditions represent the 13<sup>th</sup> cause of consultation within INSS facilities, with 54,869 consultations (1.9% of total consultations). Using the same breakdown of this category from MINSA data<sup>7</sup>, this would mean that of these consultations in E00-E87, 76% would be for diabetes, and assuming 1 consultation per month that would mean that there are 3,457 people with diabetes covered by the INSS, out of a total of about 400,000 people covered by INSS.

<sup>6</sup> ((January to October data) ÷ 10) x 12

<sup>7</sup> The general consultation data provided by MINSA breaks down consultations into the same ICD groups as the INSS statistics. Assuming similar disease patterns, 76% of consultations in ICD E00-E87 in the MINSA statistics were for diabetes, so this number was also applied to the INSS statistics.

### **3.4. Estimates**

It was extremely difficult to get any clear indication as to the number of people with diabetes in Nicaragua. For this purpose various estimates and calculations were carried out. The table below details these different statistics. The table compares 4 estimates/sources of data for the number of people with Type 1 and Type 2 diabetes: the IDF estimate(5), the CAMDI study (32) data obtained from MINSA, data derived from the quantity of insulin or oral medication ordered and finally an estimate from the RAPIA based on data from interviews. Details of how these calculations were done can be found in Appendix 5.

**Table 7 – Calculations with regards to diabetes in Nicaragua**

	Type 1 diabetes	Insulin-requiring Type 2 diabetes	Non-insulin-requiring Type 2 diabetes	Type 2 diabetes total
<b>Esteli Municipality</b>				
IDF	29			5,532
CAMDI				2,919
MINSa	31			580
Insulin ordered/CIPS data	20	167	232	399
RAPIA	12			780
<b>Pueblo Nuevo</b>				
IDF	6			1,097
CAMDI				579
MINSa	3			55
Insulin ordered/CIPS data	4	37	52	89
RAPIA	3			54
<b>Managua Region</b>				
IDF	273			61,067
CAMDI				61,389
MINSa	531			7,017
Insulin ordered/CIPS data	281	2,351	3,273	5,624
RAPIA	150			11,864
<b>Nicaragua</b>				
IDF	1,300			224,074
CAMDI				186,708
MINSa	302			22,296
Insulin ordered/CIPS data	714	5,970	8,313	14,283
RAPIA	631			38,501



It is important to note that the IDF and CAMDI estimates are calculations of the total expected number of people with diabetes, whereas the other three are based on the number of people diagnosed and/or treated within the public health system. With regards to mortality no estimates were calculated, however an estimate of life-expectancy for Type 1 diabetes using the prevalence calculated during the RAPIA and the Incidence rate of 1.5 per 100,000(5) found that the life-expectancy in Esteli (rural) was 19 years, in Managua (urban) was 25 years and overall for Nicaragua was 22 years.

### 3.5. Costs

In a study by Barcelo et al.(7) it was found that the per capita direct cost for diabetes in Nicaragua was US\$ 624. Other details from this study for Nicaragua are detailed in the table below.

**Table 8 – Estimated total direct and indirect costs of diabetes, per capita health expenditure and excess of cost of diabetes for Nicaragua(7)**

<b>Total (US\$ x 10<sup>6</sup>)</b>	<b>Indirect (US\$ x 10<sup>6</sup>)</b>	<b>Direct (US\$ x 10<sup>6</sup>)</b>	<b>Per capita direct cost for diabetes (US\$)</b>	<b>Per capita health expenditure (US\$)</b>	<b>Excess cost of diabetes (%)</b>
128.8	43.8	85.0	624	41	1,522

This data shows the high cost in Nicaragua per person with diabetes with the care for one person with diabetes being equal to the per capita healthcare expenditure for 15 people.

The IDF estimates that costs for diabetes per person at PPP were US\$ 349 (equivalent to per capita expenditure of 8 people). Estimated total costs were US\$ 81,049,000 in 2007 set to increase to US\$147,477,000 in 2025 (82% increase.)

In looking at Managua the total health budget is Cordobas 255,973,478 (US\$ 14,220,748), expenditure on insulin, syringes and strips represents 1.6% of the total budget. Esteli had a budget for 2006 for medicines of Cordobas 5,834,000 (US\$ 324,111), total expenditure on insulin was Cordobas 492,688 (US\$ 27,372) or 8.4% of the total budget on medicines.

### 4. Nicaragua's medicine supply

The current pharmaceutical policy is based on the National Drug Policy 1997-2001 and includes the following:(29)

- Institutional development
- Access to essential drugs
- Quality assurance
- Efficient use of drugs

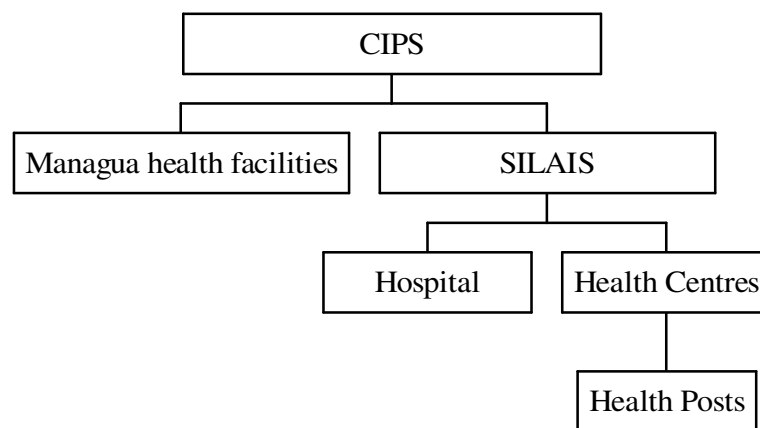
The country cannot buy all the medicines it needs due to lack of resources. Nicaragua spends Cordobas 231 million (approximately US\$ 13 million) per year on medicines. This is equivalent to Cordobas 45 (US\$ 2.5) per capita. It is estimated that twice as much as this is needed to meet all needs and also have some stock as a security measure. It is estimated that only 45.3% of the population has access to essential medicines. Purchasing of medicines in Nicaragua is dependent on 50% of external financing.(30) For example in Managua an urban Health Centre had only 80.1% of its needs in medicines met. What happens is that each health unit plans its yearly

needs. These needs then need to be adapted to the budget. A committee at each level of the health system works on the planning and determines where cuts need to be made.

MINSA purchases medicines through tenders 1-2 times per year. Each unit has their own budget for medicines and expresses its needs to MINSA.

Needs are expressed by facilities, centralised for each SILAIS and then again at MINSA. The programming at each level is carried out by a committee and in considering the needs they look at historical consumption and add an increase for new patients. Orders are then placed and the medicines are dispatched every 2 months to facilities, except in the Atlantic region where this is done every 4 months. Centro de Insumos Para la Salud (CIPS, Central Medical Stores) is responsible for the storage and distribution of medicines throughout Nicaragua. The diagram below details this process.

**Figure 6 – Diagram of public supply of medicines**



In theory doctors write prescriptions on official prescription sheets and this should indicate patient details, e.g. file number and the medicines needed for the month, with the dosage and when it should be taken. One copy of the prescription stays in the pharmacy for their records and the other copy is for the patient to know the dosage. Patient cards exist for example for pregnant women, children and people with chronic diseases. These cards allow these patients to have priority for certain medicines. For example antibiotics will be given in priority to pregnant women and children, with other people sometimes needing to purchase these in the private sector should the health facility have insufficient supplies.

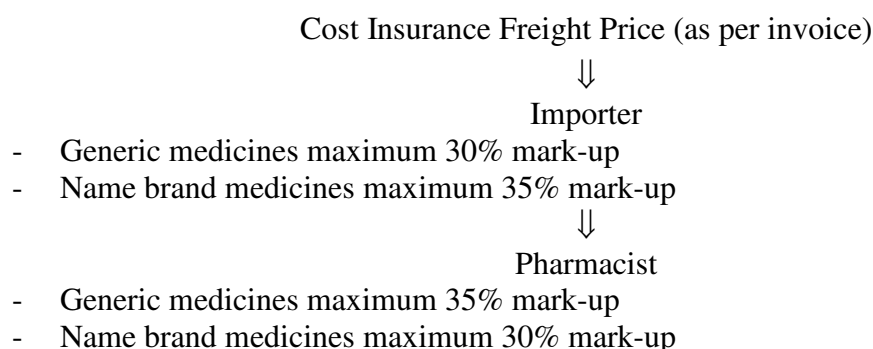
The private sector therefore plays a vital role in providing medicines that are not present on the basic list in public facilities or medicines that are not present in sufficient quantities. Private pharmacies are regulated by MINSA. The table below shows the distribution of pharmacies through Nicaragua.

**Table 9 – Distribution of pharmacies throughout Nicaragua**

Region	Number of Pharmacies	Pharmacy per 100,000 population
Boaco	25	17
Carazo	75	45
Chinandega	117	31
Chontales	108	70
Esteli	79	39
Granada	53	32
Jinotega	41	12
Leon	196	55
Madriz	15	11
Managua	767	61
Masaya	89	31
Matagalpa	82	17
Nueva Segovia	38	18
RAAN	8	3
RAAS	13	4
Rio San Juan	7	7
Rivas	40	26
<b>Total</b>	<b>1,753</b>	<b>34</b>

It is estimated that the highest cost for families with regards to health is medicines, representing 61% of total costs.(30)

There is no VAT on any medicines or medical supplies sold in the private sector. There is a 6% customs duty on all imported medical material and medicines destined for the private sector and the government controls the price of medicines in the private sector according to the following diagram.

**Figure 7 – Price control of medicines in private sector in Nicaragua**

The final price of the medicine should be labelled on the box of the medicine with the name of the distributor.

Nicaragua has an Essential Drugs List. The last published version is from 2001, but it has recently been updated, but not published. NPH (Isophane) Human Insulin, Rapid Insulin and Slow Acting Insulin in 100/IU 10 ml vial formulations are present in this list. Based on the

Essential Drugs List insulin should be available for use at hospitals.(33) Nicaragua has 30 types of insulin registered. These insulin formulations are allowed to be sold in private pharmacies in Nicaragua. A full list can be found in Appendix 6.

These insulin formulations can be sold in Nicaragua, but only the types on the Essential Drug Lists will be found in the public sector. The legal framework with regards to health states that the authorities should try to ensure that all medicines prescribed in public health facilities are generics.(31)

With regards to oral agents for diabetes, Glibenclamide (5mg tablets) and Metformin Hydrochlorate (500mg tablets) are present on the list. Glibenclamide should be present at Health Centres and Metformin at Hospitals.(33)

In the National Formulary three types of insulin are described: NPH, Crystalline and Slow Acting. The indications for usage, precautions and dosage are given. Insulin is indicated for use in Hospitals and Health Centres.(34) The formulary also includes Glibenclamide 5mg tablets and Metformin 500 mg. Again both are to be found in Health Centres and Hospitals.

### **5. Nicaragua's insulin and oral medications supply, quantification and price**

In 2005 MINSA imported a total of 67,459 vials of insulin, 64,855 of NPH Insulin and 2,604 of Rapid Insulin. Both were Human and came in 10ml 100IU vials.

The price of insulin to the MINSA in 2005 was Cordobas 98.05 (US\$ 5.92<sup>8</sup>). Total expenditure on insulin was Cordobas 6,661,734 (US\$ 399,283).

In 2006 the total amount of insulin ordered was 94,351 vials, 7,399 Rapid and 86,952 NPH. The proportions of Rapid to NPH were about 4% in 2005 and 8% in 2006. The price per vial in 2006 was on average Cordobas 91.03 (US\$ 5.06) for a vial of NPH Insulin and Cordobas 96.67 (US\$ 5.37) for a vial of Rapid Insulin. Total expenditure on insulin in 2006 was equal to Cordobas 9,005,427 (US\$ 500,302). The tender was won by a local distributor which supplied both Novo Nordisk<sup>9</sup> and Soperquimia<sup>10</sup> insulin.

This represents a 29% increase in the quantity of insulin from 2005 to 2006, but a 35% increase in cost in Cordobas (25% increase in US\$).

In 2005 a total of 8,011,495 5mg tablets of Glibenclamide and 1,375,441 500mg tablets of Metformin Hydrochloride were purchased by MINSA. The price per tablet of Glibenclamide was Cordobas 0.054 (US\$ 0.003) and Cordobas 0.596 (US\$ 0.036) for Metformin Hydrochloride. Total expenditure on oral medications for diabetes was equal to Cordobas 1,248,564 (US\$ 75,378) in 2005.

5,850,249 5mg tablets of Glibenclamide were bought in 2006. The average cost per tablet was Cordobas 0.048 (US\$ 0.003). For Metformin Hydrochloride (500mg) (total of 3,659,213 tablets) average cost per tablet was Cordobas 0.531 (US\$ 0.030). In all Cordobas 2,184,971 (US\$ 121,387) was spent for oral medication in 2006.

---

<sup>8</sup> All 2005 or other dates except for 2007 use average annual exchange rates from: [www.oanda.com](http://www.oanda.com). For 2007 the rate of US\$ 1 = Cordobas 18 is used.

<sup>9</sup> Novo Nordisk A/S, Bagsvaerd, Denmark

<sup>10</sup> Soperquimia S.A. de C.V., San Salvador, El Salvador

Total expenditure on medicines for diabetes in 2006 equalled Cordobas 11,190,399 (US\$ 621,689) or 5% of total expenditure on medicines.

MINSA has a special programme for chronic conditions and these medicines are given priority. For example insulin, a costly medication, is bought more readily than other medicines that are cheaper, as these are more affordable in the private sector than insulin. Rapid and NPH insulin, Glibenclamide and Metformin are given for free to all patients in the public sector. These medicines are also covered by INSS.

The table below details the cost per patient per year for the different treatments for Type 1 and Type 2 diabetes and different treatment regimens for Type 2 diabetes.

**Table 10 – Cost per patient per year**

	<b>Insulin NPH</b>	<b>Insulin Rapid</b>	<b>Syringes</b>	<b>Glibenclamide (5mg)</b>	<b>Metformin (500mg)</b>	<b>Total cost per month</b>	<b>Total cost per year</b>
<b>Type 1 diabetes*</b>	1 vial per month	1 vial per month	60 syringes (2 injections per day)	X	X	Cordobas 212.9 (US\$ 11.8)	Cordobas 2,554.8 (US\$ 141.9)
<b>Type 2 diabetes (minimum dosage)**</b>	X	X	X	30 tablets per month	30 tablets per month	Cordobas 17.4 (US\$ 1.0)	Cordobas 208.4 (US\$ 11.6)
<b>Type 2 diabetes (maximum dosage)**</b>	X	X	X	120 tablets per month	180 tablets per month	Cordobas 101.3 (US\$ 5.6)	Cordobas 1,216.1 (US\$ 67.6)
<b>Type 2* diabetes on insulin</b>	1.4 vials per month		60 syringes (2 injections per day)	X	X	Cordobas 152.6 (US\$ 8.5)	Cordobas 1,831.7 (US\$ 101.8)

\* - Average based on interviews with people diabetes during RAPIA

\*\* - These dosages are determined based on MINSA's diabetes protocol(35)

The Red Cross has a supply of 2,000 vials of insulin that were donated by Insulin for Life. These vials are given free to patients when they are unable to get these in the Public Sector. During discussions what is clear is that in the past 2 years the use of this supply has become more regular and is used by people for convenience now and not for emergency.

In a study carried out through within the CAMDI project it was found that 35.6% of people with diabetes used insulin, 76.1% Metformin and 35.8% Glibenclamide.(36) This was done through medical chart review at Primary, Secondary and Tertiary clinics using randomly selected records. During the RAPIA 44% of patients interviewed classified as Type 2 used insulin.

The table below shows the responses from the interviews with regards to access to insulin and oral medication for diabetes.

**Table 11 – Reported difficulties with regards to access to insulin and medicines**

<b>Problems accessing medicines</b>	<b>Overall</b>	<b>Rural</b>	<b>Urban</b>	<b>Type 1</b>	<b>Type 2</b>	<b>INSS</b>
None	86%	93%	82%	95%	82%	100%

The reported problems in urban areas were that some Health Centres did not provide the full treatment for people with Type 2 diabetes. For example the Health Centre would only give 1 vial of insulin per month, even if the person needed two or not enough tablets for a complete month. Health Centres had limits of 60 tablets of Glibenclamide (5mg) per month and/or 30 tablets of Metformin (500mg).

Another factor in urban areas is that even if patients have their consultation at a hospital, the hospital only has a supply of insulin for inpatients, except for the Mascota Hospital (Manuel de Jesus Rivera, “La Mascota” Hospital in Managua, National Paediatric referral hospital).

Patients attending consultations in hospitals then need to go to a Health Centre to get their insulin, causing some difficulties for them. In Esteli NPH insulin is available at Health Posts, but not Rapid insulin. In Managua Health Posts did not provide insulin or other medication for diabetes. If patients need to get Rapid insulin they are either referred to the Hospital or Health Centre. Another problem was that only two doctors at the Mascota could write prescriptions for insulin and that children living outside of Managua had to come to Managua to get their insulin. However, if the doctor wrote a prescription for a supply of more than 2 months this would be filled by the pharmacy. The pharmacy at the Mascota in this case asks for the family to return empty vials in order to check the insulin has been used and not sold.

These were the only observed problems with regards to access to insulin and medicines. Rapid insulin has only recently been made available in Health Centres, prior to this it was only available in hospitals. Many patients and healthcare workers do not know this. In addition not all Health Centres have been supplied with Rapid insulin for outpatient use.

Two facilities visited used chronic patient cards that indicate the disease and medication the patient needs.

The following two tables look at insulin access per region.

**Table 12 – NPH insulin data per region**

<b>Region</b>	<b>Vials of insulin NPH</b>	<b>Vials NPH per 100,000 population</b>	<b>Percentage of total population</b>	<b>Percentage of total NPH insulin</b>
Boaco	1,748	1,160	2.9%	2.0%
Carazo	6,077	3,659	3.2%	7.0%
Chinandega	3,401	897	7.4%	3.9%
Chontales	3,320	2,157	3.0%	3.8%
Esteli	4,733	2,348	3.9%	5.4%
Granada	2,572	1,529	3.3%	3.0%
Jinotega	2,685	810	6.4%	3.1%
Leon	5,151	1,448	6.9%	5.9%
Madriz	333	251	2.6%	0.4%
Managua	34,217	2,709	24.6%	39.4%
Masaya	7,215	2,488	5.6%	8.3%
Matagalpa	4,559	972	9.1%	5.2%
Nueva Segovia	1,352	648	4.1%	1.6%
RAAN	1,763	561	6.1%	2.0%
RAAS	2,945	961	6.0%	3.4%
Rio San Juan	509	532	1.9%	0.6%
Rivas	4,317	2,762	3.0%	5.0%
<b>TOTAL</b>	<b>86,897</b>	<b>1,690</b>		

**Table 13 – Rapid insulin data per region**

<b>Region</b>	<b>Vials of insulin Rapid</b>	<b>Vials Rapid per 100,000 population</b>	<b>Percentage of total population</b>	<b>Percentage of total Rapid insulin</b>
Boaco	44	29	2.9%	0.6%
Carazo	239	144	3.2%	3.2%
Chinandega	811	214	7.4%	11.0%
Chontales	348	226	3.0%	4.7%
Esteli	501	249	3.9%	6.8%
Granada	78	46	3.3%	1.1%
Jinotega	150	45	6.4%	2.0%
Leon	1,007	283	6.9%	13.7%
Madriz	195	147	2.6%	2.6%
Managua	2,225	176	24.6%	30.2%
Masaya	528	182	5.6%	7.2%
Matagalpa	291	62	9.1%	3.9%
Nueva Segovia	235	113	4.1%	3.2%
RAAN	353	112	6.1%	4.8%
RAAS	146	48	6.0%	2.0%
Rio San Juan	68	71	1.9%	0.9%
Rivas	150	96	3.0%	2.0%
<b>TOTAL</b>	<b>7,369</b>	<b>143</b>		



**Table 14 – Comparison reported cases of diabetes and insulin ordered**

<b>Region</b>	<b>Number of people with diabetes (MINSA)</b>	<b>Total insulin-requiring diabetes*</b>	<b>Vials NPH</b>	<b>Total insulin-requiring diabetes**</b>
Boaco	565	264	1,748	134
Carazo	861	403	6,077	467
Chinandega	1,533	717	3,401	262
Chontales	506	237	3,320	255
Esteli	700	328	4,733	364
Granada	807	378	2,572	198
Jinotega	216	101	2,685	207
Leon	2,857	1,337	5,151	396
Madriz	137	64	333	26
Managua	9,636	4,510	34,217	2,632
Masaya	1,130	529	7,215	555
Matagalpa	1,424	666	4,559	351
Nueva Segovia	302	141	1,352	104
RAAN	540	253	1,763	136
RAAS	270	126	2,945	227
Rio San Juan	81	38	509	39
Rivas	731	342	4,317	332
<b>TOTAL</b>	<b>22,296</b>	<b>10,435</b>	<b>86,897</b>	<b>6,684</b>

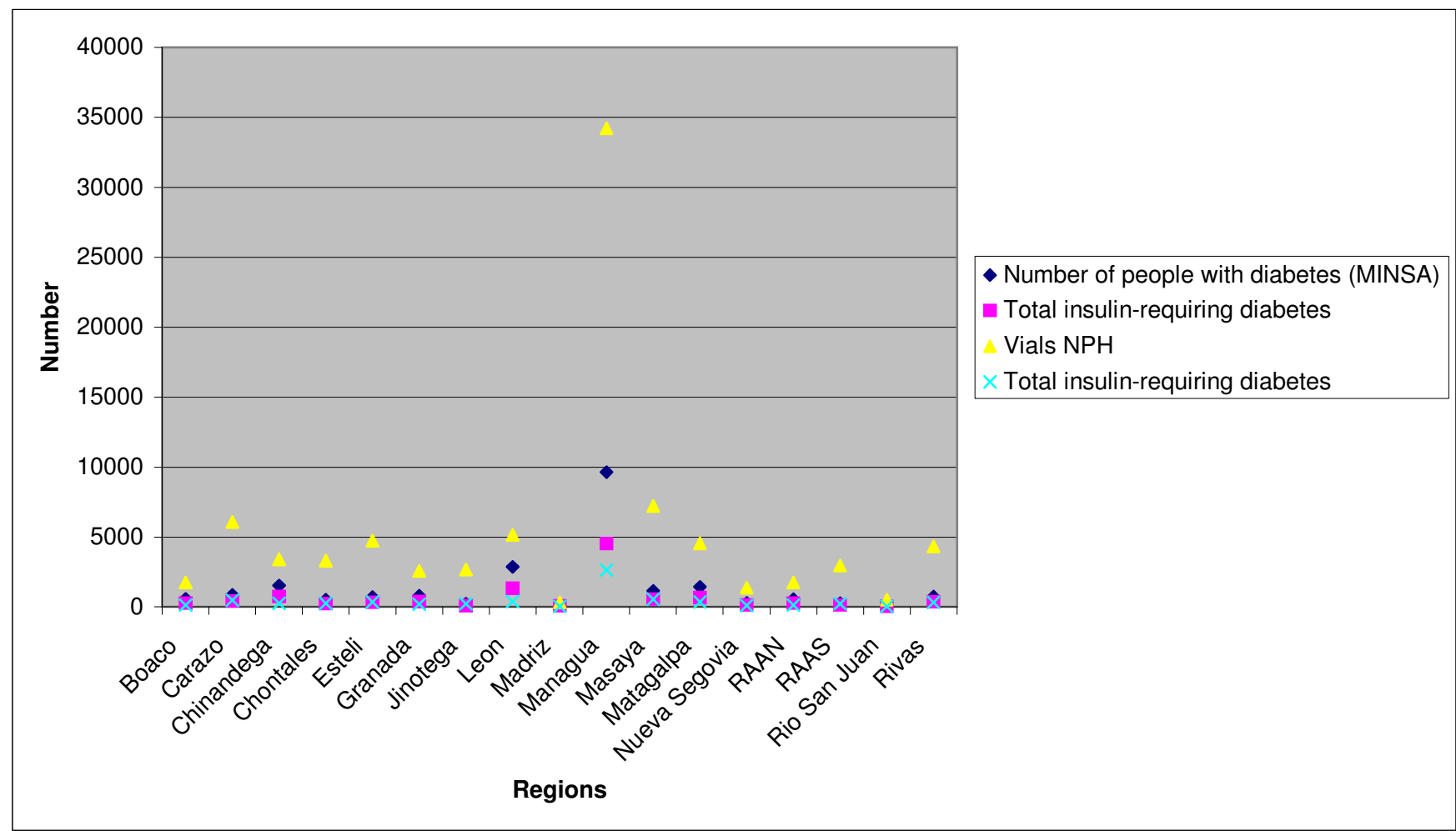
\* - Assuming 5% Type 1 diabetes and 95% Type 2 and that 44% of people with Type 2 diabetes require insulin

\*\* - Assuming 13 vials per year(37)

Table 12, Table 13 and Table 14 show that there is no clear link between the quantity of insulin ordered and the number of reported people with diabetes or the total population.

This information is presented graphically below.

**Figure 8 – Graph of Number of people with diabetes, Total insulin-requiring diabetes (calculated), Vials NPH (CIPS) and Total insulin-requiring diabetes (Assuming 13 vials per year)**

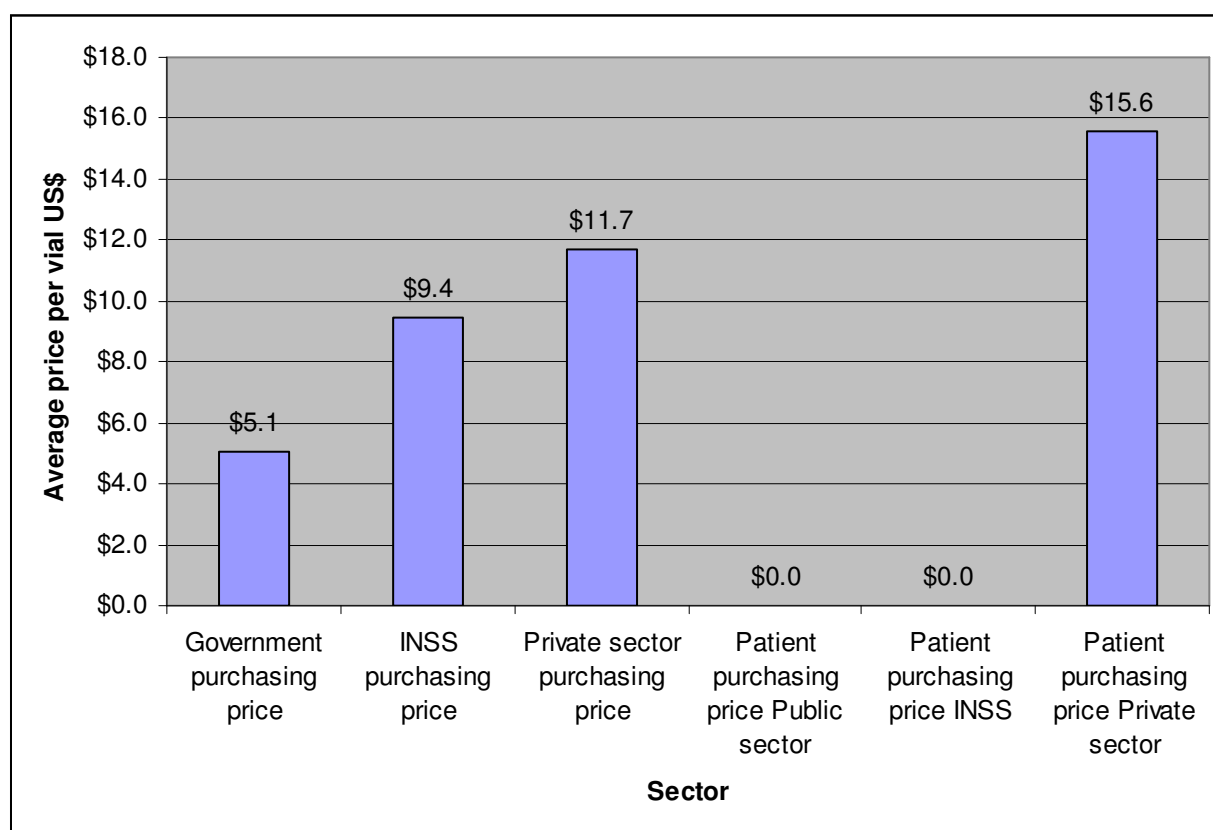


There were no observed or reported problems with the cold chain. Most health facilities store insulin in fridge. 20% of people interviewed who use insulin do not have a fridge. They store their insulin in clay pots, coolers or with family members or neighbours who have fridges.

Health facilities operating under the INSS will purchase insulin through distributors. This insulin is then provided for free to patients.

In the private sector many pharmacies do not sell insulin as there is very little demand, insulin is very expensive and hard to manage. In the pharmacies surveyed the average purchasing price for the pharmacy was Cordobas 210 (US\$ 11.7) for a vial of Human NPH. This vial was then sold for Cordobas 280 (US\$ 15.5). This was similar for Rapid insulin. Other insulin formulations resented in the private sector were Lente, cost to the patient of Cordobas 330 (US\$ 18.3) and Lantus cost to patient Cordobas 1,184 (US\$ 65.8). The graph below shows the different average purchasing and selling prices for NPH insulin in Nicaragua.

**Figure 9 – Average purchasing prices for a vial of NPH insulin in Nicaragua**



## 6. Access to Syringes

Insulin syringes should be available at Health Posts and 1 syringe should be given to the patient for each injection of insulin.(38) A total of 1,542,507 syringes were required by health facilities in 2006. Only 1,297,935 were actually ordered by Central Medical Stores in 2006. Assuming 1 syringe is given per injection and a person with diabetes on average has 2 injections per day, this quantity of syringes would be enough for 1,934 people with diabetes requiring insulin injections. The average purchasing price per syringe for MINSA is Cordobas 0.42 (US\$ 0.02).

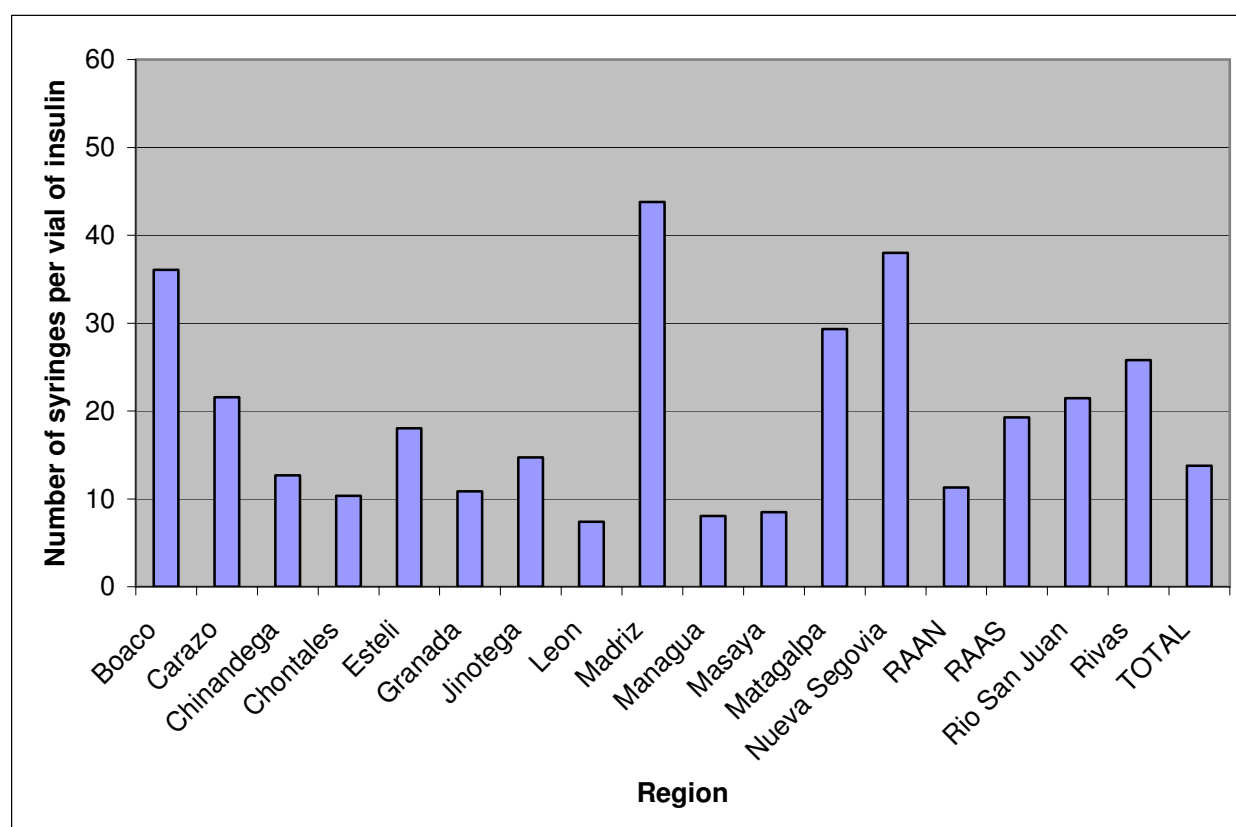
Due to this shortage in central supply some patients only receive a few syringes and others none depending on where they receive their care. This leads to many patients needing to purchase syringes in private pharmacies at an average cost of Cordobas 2.7 (US\$ 0.15). Due to this cost access to syringes was more problematic then access to insulin, as detailed in the table below.

**Table 15 – Reported difficulties with regards to access to syringes**

Problems accessing syringes	Overall	Rural	Urban	Type 1	Type 2	INSS
None	51%	58%	46%	54%	49%	75%
Sometimes	25%	21%	29%	29%	23%	0%
Always	24%	21%	25%	17%	29%	25%

It is interesting to note that syringes in the rural areas visited were cheaper then in urban areas, average price Cordobas 2.4 (US\$ 0.13) versus 2.9 (US\$ 0.16). Most children will get some assistance from APNJDN, whereas most adults will need to purchase their syringes. In looking at data from CIPS on syringe distribution for 1 year, the following was calculated.

**Figure 10 – Ratio of syringes to vials of NPH insulin**



The graph above shows that for most regions the public sector does not provide enough syringes. Even using one syringe per day, would mean that the ratio of syringes to vial would be 30 (30 syringes per month, 1 vial per month), however only 4 regions meet this criterion.

For some people needing to inject insulin this cost means that they re-use their syringes. Many reported only re-using syringes when they did not receive enough from health facilities or had financial problems to buy them. 90% of people with Type 1 diabetes used their syringe only once, whereas only 58% of people with Type 2 diabetes did this.

## **7. Diabetes Care**

Diabetes care in public facilities and facilities covered by the INSS is free. This includes consultations and laboratory investigations. Diabetes consultations in Health Centres are carried out by chronic disease focal points. Each patient has a patient file with basic personal information and their clinical history. In some facilities patients are also given a chronic patient card. This contains:

- Patient's name
- File number
- Address
- Neighbourhood
- Diagnosis
- Observations
- Medicines prescribed and quantities

Most children with Type 1 diabetes will be seen at the Mascota.

There is a very detailed protocol for the attention of diabetes. It provides all aspects of care for diabetes in a “clinical guidelines” format for both Type 1 and Type 2 diabetes. It is based on American Diabetes Association (ADA) guidelines and other sources. These are ambitious guidelines including a variety of laboratory and other investigations that are not readily available in Nicaragua, at least in the public sector. The summary of this can be found in Appendix 7. There is also treatment algorithm for Type 2 diabetes included in the document and information of insulin treatment for patients with Type 1 diabetes. Many healthcare workers were unaware of these guidelines or did not use them.

MINSA is in the process of strengthening care including referral and counter-referral between health facilities in order to ensure continuous care. It has also started the development of the concept of “Equipos de atención” (Care teams) for diabetes including psychologists, nurses, laboratory technicians, etc.

A majority of patients interviewed had no problems accessing trained healthcare workers. In both rural and urban areas 74% and 73% of people reported that they were able to access trained healthcare workers for their diabetes care.

In a survey carried out by CAMDI it was found that 97.6% of patients with diabetes had their blood pressure, 15.7% height, 3.1% eye exam, 19% foot examined.<sup>(36)</sup> This survey was done by reviewing medical charts at Primary, Secondary and Tertiary clinics through randomly selected records. The table below shows if the person interviewed during the RAPIA has ever had one of the following exams based on different criteria such as place of residence, type of diabetes and if they are insured.

**Table 16 – Percentage of people who have had the following exams done**

	<b>Height measured</b>	<b>Weight measured</b>	<b>Eyes tested</b>	<b>Feet checked</b>	<b>Urine tested</b>	<b>Blood tested</b>	<b>Blood pressure measured</b>
<b>Urban</b>	74%	91%	52%	41%	69%	85%	87%
<b>Rural</b>	75%	92%	50%	44%	75%	83%	97%
<b>Type 1 diabetes</b>	77%	90%	42%	35%	52%	81%	81%
<b>Type 2 diabetes</b>	72%	91%	55%	45%	81%	86%	97%
<b>INSS</b>	67%	100%	67%	50%	83%	100%	100%
<b>Overall</b>	77%	94%	53%	44%	74%	87%	94%

Diabetes care with regards to checking of basic measures (height, weight, blood and urine glucose) is variable even within the same facility. Only the Mascota Hospital seems to provide standardised care and exams for all patients. Patients in rural areas seem to have more difficulty accessing specialised exams for example for eyes, etc. Otherwise many rural patients are able to spend more time and get more basic exams done, as the number of patients in each facility is smaller. Patients who are covered by Social Security have better access to all exams.

Both Insulin Dependent and Non-Insulin Dependent diabetes are included in the diseases covered by the INSS. Rapid and NPH insulin are in the basket of medicines offered, as well as Glibenclamide and Metformin, but not syringes. With regards to laboratory tests blood glucose tests are included in the tests offered by the INSS. Most diabetes complications will not be covered.

Of the patients interviewed the 46% presented with classical symptoms of diabetes (polyuria, polydipsia, etc.), 38% were diagnosed during a medical exam for another health problem and 15% during a routine check-up. Most children were diagnosed with the classical symptoms of diabetes. A doctor diagnosed all patients interviewed. 52% of patients were not referred to another facility following their diagnosis for their routine diabetes care. All children were diagnosed at the Mascota, referred there or suggested to go there. Some children in Esteli and Pueblo Nuevo were unable to go there due to the cost of travel. In rural areas 100% of people with Type 2 diabetes interviewed went for a consultation for their diabetes every month, compared to 48% in urban areas. This difference is similar as well for people with Type 1 diabetes with 80% and 40% of people in rural areas and urban areas respectively going for monthly consultations.

In both urban and rural areas the majority of people interviewed had to travel less than 30 minutes to receive their diabetes care. The most extreme example was a young girl who needed to travel 1 whole day to attend her diabetes consultation in Managua at the Mascota. Because of the centralisation of care at the Mascota on average travel time for people with Type 1 diabetes was slightly longer then for people with Type 2 diabetes. On average total travel cost was Cordobas 29.7 (US\$ 1.7). The average in rural areas was Cordobas 19.5 (US\$ 1.1) and in urban areas was Cordobas 32.9 (US\$ 1.8). For people who travelled to Managua to receive their care the average cost was Cordobas 64.0 (US\$ 3.6). In Managua of the adult patients interviewed 7% came from outside Managua to receive their care.

During discussions and interviews some patients complained of the long waiting time and short consultation times.

**Table 17 – Average waiting and consultation times**

	<b>Urban</b>	<b>Rural</b>	<b>INSS</b>	<b>Public</b>	<b>Type 1 diabetes</b>	<b>Type 2 diabetes</b>
<b>Average waiting time (minutes)</b>	102	168	78	132	102	138
<b>Average consultation time (minutes)</b>	13.3	15.8	20	14.3	14	14.5

Due to fewer patients in rural areas the doctor is able to spend more time with them. This leads to a longer waiting time. Patients attending INSS clinics have the shortest waiting time and longest consultation. This long waiting time leads to problems with work with this factor being the second most common factor for people having problems attending their appointments for diabetes care after the issue of travel cost. For people with Type 1 diabetes travel distance and time was the most common barrier, this is due to most care being provided centrally at the Mascota.

In the private sector consultations can cost up to Cordobas 500 (US\$ 27.8). Patients go to the private sector as:

- They do not want to wait
- They have the money
- Differentiation
- Doctor has time to listen
- Treated differently

There is a clear line between patients who can and cannot afford private care. In the private sector in Managua the full spectrum of care for complications is present.

In all the chronic clinics visited nurses play only a support role. They help with education, help take measurements, weight, height, blood glucose, etc. Some have received specialised training in Nicaragua or abroad.

It was observed that problems exist with referrals and counter-referrals to Hospitals from Health Centres and back. Patients face long waiting times for external/specialised consultations. Also some patients are never sent back to the Health Centre they were referred from. In Esteli, for example, there were 8 referrals from Health Centres to the Hospital, but 0 counter-referrals.

A standard consultation for diabetes in all areas visited has the following basic steps:

1. Person attends appointment
2. Most of the time a blood glucose test will be given
3. Other measurements: weight, height, blood pressure, etc.
4. Consultation with doctor
5. Prescription of medicines
6. Following appointment



## 7.1 Managua

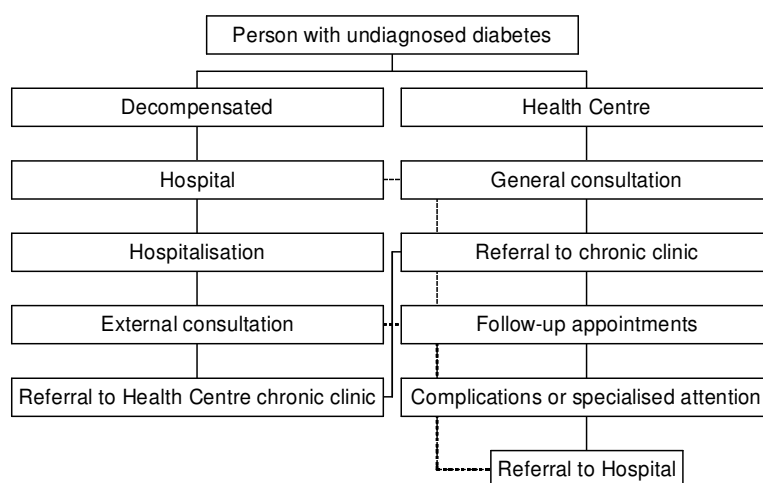
Many of the hospitals in Managua as well as serving as centres for care for the population in Managua are also national referral centres.

Some hospitals have external diabetes consultations that run as normal diabetes clinics and other only have these clinics for people who have recently been released from hospital, before being sent back to the Health Centre and as a specialised consultation for people with diabetes referred from Health Centres.

Health Centres in Managua have chronic clinics and a diabetes consultation once a week.

The diagram below details the path of a patient with Type 2 diabetes in Managua from the time before diagnosis until follow-up.

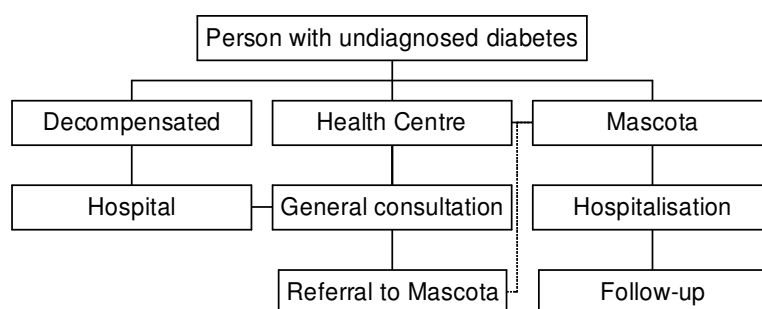
**Figure 11 – Path of a person with Type 2 diabetes in Managua**



Consultations in both Health Centres and Hospitals will run in a similar fashion, with patients attending their appointment, getting their blood glucose measured, other measurements taken (blood pressure, height, weight, etc.), consultation with doctor, prescription of medicines and next appointment date. Education for the patient will be given at different times, at the time of diagnosis and also during each consultation. This education is given by both the healthcare worker and the diabetes club. Some Health Posts also have diabetes consultations, but this is not standardised.

For Type 1 diabetes all care in Managua is centralised at the Mascota. No matter where the child is initially diagnosed they will be referred and their follow-up will be done at the Mascota.

**Figure 12 – Path of a person with Type 1 diabetes in Managua**



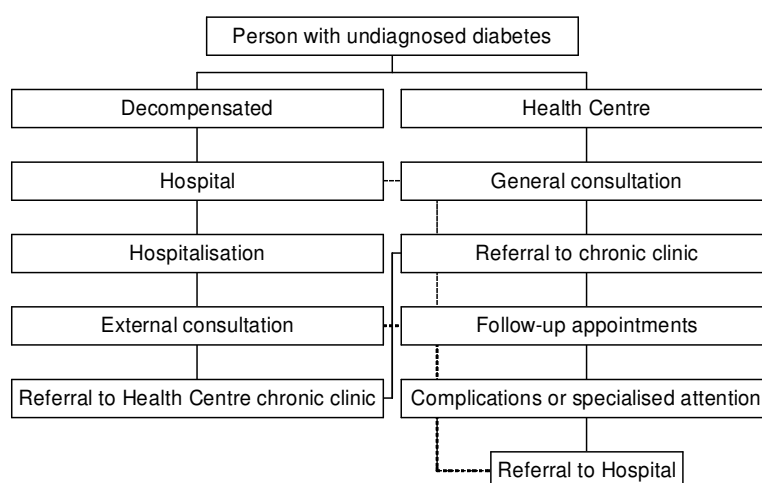
Education for the child and their family will be given at different times, at the time of diagnosis and also during each consultation. There is also a close link between the hospital and APNJDN with regards to education and support. The Mascota is the national referral facility for paediatrics, however many adolescents (and even some adults the eldest patient seen there is in their 30's) are seen for their Type 1 diabetes. There is a certain priority given to children, with adolescents facing problems for follow-up and also treatment of other conditions.

In Managua there is quite a clear demarcation between facilities in the private and public sector. Some patients who normally go to the public sector will go to the private sector for specific care, but most will either stay in one system or the other.

## 7.2 Esteli

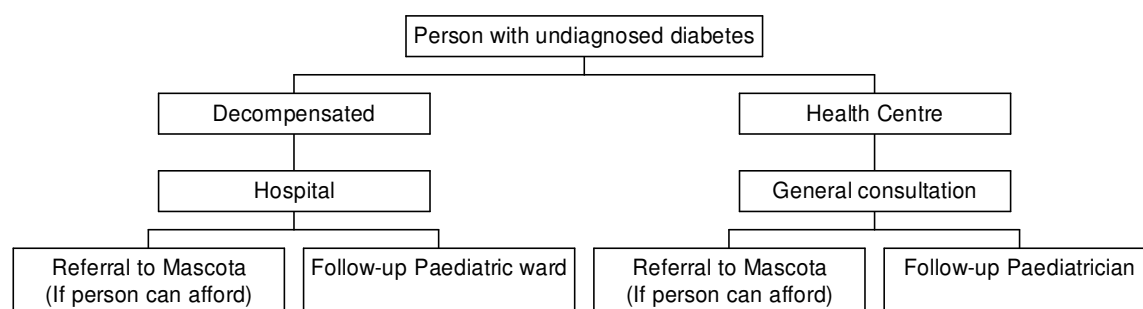
In Esteli the Hospital is mainly used for patients with complications and also for initial diagnosis. The majority of patients will be seen at the Health Centre. The consultation is similar to that in Managua. The Health Centre in Esteli will treat the majority of patients. There are problems with counter-referral from the Hospital to the Health Centre.

**Figure 13 – Path of a person with Type 2 diabetes in Esteli**



With regards to children, those who can afford to are sent to Managua for their routine care. Others are either followed in the Paediatric ward at the hospital or by a paediatrician at the Health Centre.

**Figure 14 – Path of a person with Type 1 diabetes in Esteli**



What is interesting is that in Esteli many NGO and Private facilities visited will refer patients to the Health Centre or Hospital after diagnosing diabetes. Some will also only treat non-insulin requiring patients after their initial diagnosis.

In Esteli as well Health Posts to a larger extent than in Managua provide diabetes clinics. Most also have medicines for diabetes including insulin, whereas their equivalent in Managua do not.

### 7.3 Pueblo Nuevo

In Pueblo Nuevo all care is provided by the Health Centre by the doctor responsible for chronic patients. Patients are referred to the Hospital in Esteli for any complications, but have difficulties accessing the hospital, either because of travel cost or because they need to go to the hospital several times, once to get appointment and the other time for the actual appointment.

The Health Centre also cares for children with Type 1 diabetes, but they are managed as if they had Type 2. They receive no priority for insulin, syringes or blood glucose testing and no specific information about diet and care.

## 8. Diagnostic tools and infrastructure

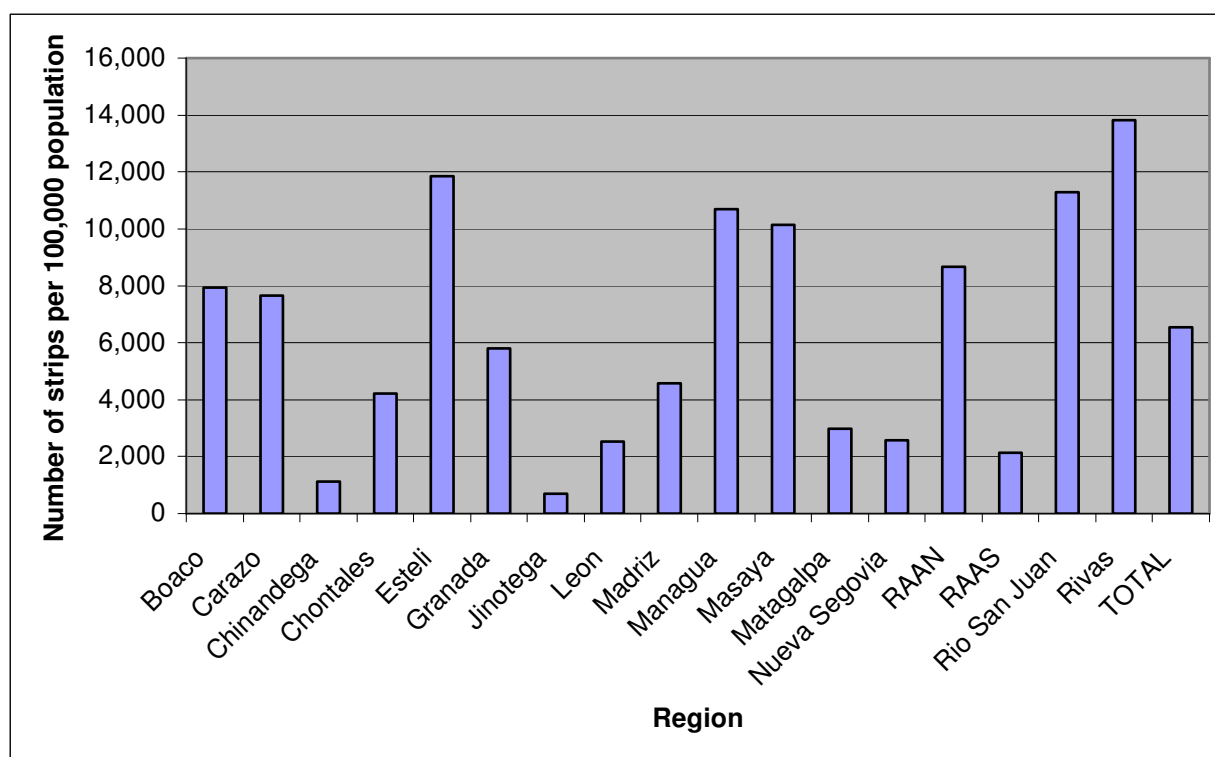
Blood glucose test strips should be available at Health Centres as should urine test strips for glucose and ketones according to the “Lista Basica – Reactivos y Material de Reposición Periodica de Laboratorio Clínico y Patología” (Basic List – Reagents and Material for periodic replacement for Clinical and Pathology Laboratories).(39)

In 2006 a total of 336,550 strips for glucometers were purchased MINSA at a total cost of Cordobas 1,202,239 (US\$ 66,791). The average price per strip was Cordobas 3.6 (US\$ 0.20). Assuming one test per month this quantity would be sufficient for a total of 28,045 people with diabetes.

At the hospitals visited blood glucose was done using a spectrophotometer. Glucometers were also present in some hospital wards. The only tool used for diagnosis and follow-up in Health Centres were glucometers. There were problems at all levels with the supply of strips and various reagents for testing.

In one Health Centre visited due to a lack of strips the doctor decided which patients should and should not receive a test. This led to a situation with some patients not receiving a blood glucose measurement for a few months. In another Health Centre the glucometer was kept at the chronic patient consultation and the laboratory had no means of testing blood glucose.

**Figure 15 – Number of strips for glucometers per 100,000 population**



Two brands of glucometers were present in health facilities, ACON<sup>11</sup> and Roche<sup>12</sup>. 95% of health facilities visited had a glucometer and only 72% had consumables for these. The table below details the presence of other tools for diagnosis.

**Table 18 – Presence of different diagnostic tools in health facilities visited**

	Urine strips	Ketone Strips	Glucometer	Consumables for glucometer
<b>Urban</b>	61%	56%	100%	86%
<b>Rural</b>	55%	52%	91%	67%
<b>Overall</b>	59%	54%	95%	72%

Healthcare workers stated that the problems with the lack of supplies and unavailability of some of the tests listed on the Diabetes Protocol (See Appendix 7) in Nicaragua lead to poor patient follow-up.

In addition the availability of other tools such as Snellen charts, reflex hammers, ophthalmoscopes and other tools necessary for a proper diabetes check-up were lacking.

The private sector was often used by patients for routine follow-up. These facilities had glucometers or spectrophotometers and charged on average Cordobas 45.4 (US\$ 2.5) for a blood glucose and Cordobas 40.4 (US\$ 2.2) for a urine test.

<sup>11</sup> ACON Laboratories Inc., San Diego, USA

<sup>12</sup> F. Hoffmann-La Roche Ltd, Basel, Switzerland

In Managua there is the National Reference Laboratory located at MINSA, which can carry out a variety of specialised tests unavailable in public health facilities, such as:

- Fasting Glucose
- Post-prandial glucose
- Oral Glucose Tolerance Tests
- HbA1c

All patients from public sector can be referred by a specialist to the laboratory and receive their test for free. Currently there are only about 400-500 HbA1c tests carried out per year. The capacity of the equipment present is 200-300 tests per hour at an estimated cost for the reagents of Cordobas 0.58-0.63 (US\$ 0.03-0.04) per test. The method used by the laboratory is recognised internationally.<sup>13</sup>

Most of the HbA1c tests carried out are for children from the Mascota. Doctors at the Mascota have a special selection process to choose children to come for the test. The remainder of these tests are done for private patients.

The laboratory receives samples for other conditions, HIV/AIDS, etc. from all regions in Nicaragua. They are then able to fax results to the health facilities and also send hard copies. Problems exist though with regards to transportation, organisation and resources.

## **9. Healthcare workers and training**

MINSA organises training every year for 2-3 people from each SILAIS to come to Managua for training regarding diabetes. However, this has not been working in the past few years.

38% of healthcare workers interviewed (the healthcare workers interviewed were chosen as they were responsible for care of people with diabetes) had not received any specialised training in diabetes, 70% of these health workers were nurses.

During their medical training, students learn basic principles of diabetes in different areas and classes e.g. physiology. They will also learn about diabetes complications in for example orthopaedics and ophthalmology. Students in Nicaragua need to carry out one year of social service. During this year students will treat patients with all types of health problems including diabetes and learn practical aspects then.

There is also a postgraduate Diploma course over 18 months in diabetes organised by the University, which costs US\$1,200 (equivalent to about 4 month's salary for a doctor). The course includes:

- Epidemiology and quality of care for diabetes
- General aspects of diabetes
- Nutrition and healthy lifestyle
- Education techniques for diabetes
- Pharmacotherapy for diabetes – the use of oral medicines and insulin
- Acute complications of diabetes
- Chronic complications
- Concomitant diseases

---

<sup>13</sup> The method used meets international specifications (NGSP/DCCT/UKPDS)(40)

For nurses and other support staff there is also a free 40-hour course on diabetes. Each year approximately 30 students attend this class, which is organised and funded by PAHO.

## **10. Chronic patient clubs and community involvement**

In Nicaragua there is a strong role of civil society and community participation and this is even stated in Article 5 point 5 of the General Law on Health.(31)

MINSa has also developed a guide for the “organisation and functioning of clubs for patients with chronic non-communicable diseases”.(41) The reason behind the creation of these clubs was the realisation of the increasing numbers of people with chronic conditions and that the health system alone could not cope with this increase. The role of these Clubs is to teach patients the management, risk factors and signs of complications. The director of each municipality and person responsible for the chronic disease programme in each health unit have as their responsibility to facilitate the education, medical care and assist the clubs with different technical aspects of their organisation and operation. One of the areas that clubs focus on is education with regards to increasing disease specific knowledge of patients. The aim is to give people the knowledge of how to control their disease. One component of the education is to integrate family members so they can assist in the care and healthy living of the person with the chronic condition. In Appendix 8 there is the types of education sessions that are suggested from the guide.(41)

Another aim of these clubs is to promote healthy lifestyles and also have a recreational function to build a feeling of community. These Clubs work within the framework of the chronic clinics in Health Centres and some Health Posts. There are Clubs for each condition, e.g. diabetes, hypertension and asthma. The doctor responsible for the clinic provides support to the club. Each patient pays a small contribution Cordobas 10-20 (US\$0.55-1.11) when they can. This contribution is to organise events, buy test strips or provide refreshments. In some facilities visited this contribution was often mistaken as a payment for care.

The Chronic club at one Health Centre in Managua organised exercise sessions, others education sessions or even outings. For example the Diabetes Club in Esteli had 150 members and its mission was to bring together all people with diabetes in the Municipality, with the aim of helping everyone improve their diabetes care. The contributions they collected from patients were used to assist with the purchase of blood glucose strips, assist with education sessions and buy refreshments.

The APNJDN has as its aims, that:

- The family of the person with diabetes and the person with diabetes know, accept and work together for the treatment of the condition
- The person with diabetes plays a full role in society and diabetes is not a social burden for them

Their main objectives are to:

- Facilitate the daily treatment of people with diabetes.
- Detect diabetes in all children as soon as possible
- Carry out training sessions
- Support to the Hospital Manuel de Jesus Rivera Hospital (La Mascota)
- Organise yearly fund raising activities

They organise events for:

- World Diabetes Day

- World Children's Day
- Monthly meetings for discussion

These monthly meetings provide the opportunity to discuss issues that are not discussed during consultations and discuss diabetes in everyday life of the child and their family.

The APNJDN is also organising a large fundraising event. The funds from this event will go to buy materials to give to children, such as syringes, strips, glucometers, etc. The Association also works closely with MINSA in ensuring adequate supplies are provided to the Mascota.

Associated with the Nicaraguan branch of the Red Cross there was a semi-active diabetes association. This association came into existence as the Red Cross received an annual donation of 2,000 vials of NPH insulin from Insulin for Life USA. It was said that this donation might end in 2007. The association was planning to have education and provide care as well, but due to the illness of the President of the diabetes association this did not happen. There are 1,200 registered people with insulin-requiring diabetes at the Red Cross, mainly from Managua. Besides insulin they have a few syringes. People mainly come from Health Centres to get their insulin. Poor patients mainly used this stock when the Public Sector did not have any insulin. People needed to have their prescription in order to get their supplies for free. The availability of insulin at the Red Cross was mainly spread by word of mouth and by healthcare workers who were aware of this supply. The Red Cross is also involved in many community and prevention programmes. The Red Cross houses and supports the Nicaraguan Association of Haemophiliacs in providing care, medicines and social support.

There is also the Fundacion Nicaraguense para la Diabetes (FND) located in Managua. Its membership about 2,300 people and is composed of adults with Type 2 diabetes. It has been running for 7 years and its main activities are running education sessions for people with diabetes. The Foundation has no funds and its activities are run with community contributions (snacks provided during the education sessions) or donations from private companies (strips for blood glucose testing during education sessions). They are in the process of filling in the application to become members of IDF.

The Fundacion Por Ayuda a Enfermos Cronicos (FUNDPEC, Foundation for the Assistance to Chronic Patients) was created because of lack of interest that MINSA had in Chronic conditions and is established as a not for profit self-sufficient foundation. It is a member of the IDF. The Foundation runs a clinic and charges Cordobas 150 (US\$ 8.3) for each consultation. They provide integral care for diabetes, and have a:

- Nutritionist
- Ophthalmologist
- Endocrinologist
- Diabetologist

that provide care for patients. Integrated with this is education on different aspects of diabetes. Patients like the quality of the attention and therefore come for care rather than going to public facilities where care is free. It also has a pharmacy where it sells medicines at a lower cost than in the private sector. FUNDPEC has a lab and patients pay for tests.

There is no membership to FUNDPEC and it is in the process of reactivating a patient's club. In the past they organised events on Saturday's to give people the opportunity to talk about their diabetes. FUNDPEC attends about 2,000 chronic patients; the majority of them have diabetes. People come through word of mouth or are sometimes referred by doctors. They have some

materials given by the industry and the founder wrote a book entitled “Un Grano de Azucar para el Diabetico” (A grain of sugar for the diabetic).(42) This describes diabetes and gives dietary and other advice. FUNDPEC is also involved in planning meetings at the Ministry.

## **11. Patient education**

Different sources of information are available in health facilities regarding diabetes. These range from pamphlets distributed by pharmaceutical companies to specialised leaflets on foot care, exercise and diet from MINSA or other sources.

Education sessions and general discussions are also organised by the Chronic Clubs at some health facilities and during interviews with patients the majority received their information from this source (32%). For children the APNJDN provides education sessions as well. For Type 1 diabetes outside of Managua there is no specialised education and these patients receive the same information as people with Type 2 diabetes.

The next source of information received by people with diabetes was different written information from health facilities (21%). 68% of healthcare workers met said they had some form of information they distributed to patients and 53% had some form of visual aids. These varied from “homemade” posters and panels to a folder developed by MINSA on healthy living. As mentioned above the information distributed is not standardised and quality and content varied from facility to facility.

This was followed closely (20%) by the information being given by a healthcare worker, primarily doctors, during the consultation. 12% of people stated they had received no information whatsoever about diabetes. These numbers were equally distributed between people interviewed in urban and rural areas.

What is clear from discussions with patients is that the information they have received is insufficient and is relatively superficial. 18% of people using insulin had received no indications with regards to its use. Most of the education seems to be focused on diet and lifestyle. Also in some cases the education sessions are given for all of those with chronic conditions and not disease specific.

Overall healthcare workers and patients themselves admit that they have low knowledge of diabetes.

## **12. Adherence issues**

Only 18% and 23% of people met during this assessment self-monitor their urine and blood glucose respectively. The majority of these respondents were children from the Mascota who receive strips and glucometers from APNJDN.

The average cost of monitoring (either with equipment purchased or going to a private laboratory) for urine was reported to be Cordobas 199 (US\$ 11.1) and Cordobas 637 (US\$ 35.4) per month for blood glucose.

For example the price of a glucometer is Cordobas 2,160 (US\$ 120), which represents 4% of per capita GDP.

The main problem found during this study was poor adherence to diet and lifestyle instructions. People with diabetes said that this was due to economic factors, and healthcare workers stating



that it was due to economic factors and lack of support from family members. Another factor affecting adherence reported by healthcare workers was people self-medicating.

### **13. Policy Framework**

MINSa sets national priorities with regards to NCDs, these are then implemented at each SILAIS. There is one person at MINSa who is responsible for NCDs. The department for chronic conditions comes under the department of “Dirección General de control y asegurancia de la calidad de los servicios de salud” (General Directorate for the control and quality assurance of health services) and reports directly to Minister of Health. The main role of this person is with regards to:

- Prevention
- Quality control
- Monitoring
- Health promotion

This person, in theory, has a counterpart at each SILAIS responsible for similar aspects at a regional level.

The role of the head of the programme at the SILAIS level is to provide technical support, supervision, monitoring, training, implementation of norms and protocols and participate in planning. In Esteli the SILAIS has implemented a monitoring report each month with regards to the diabetes protocol (Appendix 7) to check what has and has not been done for each element of the protocol. However there are some difficulties in getting these completed and they do not necessarily lead to any action as their targets are hard to attain.

At the municipal level in the Health Centre there is a doctor responsible for chronic patients. The doctor is responsible for the programme and its organisation, for technical assistance to the club, education sessions and care.

The structure of health interventions in Nicaragua is to first have a policy then a plan followed by specific programmes and projects. This is yet to be done with regards to diabetes.

MINSa has also recently established 3 working groups on NCDs. These have as their aim to: analyse the situation with regards to NCDs, prepare a regulatory framework and designing a proposal and plan for NCDs.

### **14. Prevention**

With regards to prevention the General Law on Health(31) states that MINSa should collaborate with the Ministry of Education with regards to health education. In addition under Section VIII, Article 25, MINSa is required to promote prevention activities, healthy lifestyles and research into NCDs with the aim of developing policies, strategies, plans, programmes and projects for their management and control.

The focus of prevention in Nicaragua is on endemic diseases, emerging and re-emerging problems that affect the population as a whole, but more specifically targeting the population who are poor or extremely poor. Also due to their increase special attention will be given to non-communicable diseases. This will be done by:

- Improving surveillance systems for both communicable and non-communicable diseases
- Promotion of breast feeding

- Intersectoral policy with regards to food security, with a specific priority on adequate diet
- Strengthening health promotion and prevention services and rehabilitation with participation of the family and community

In discussions with healthcare workers and health authorities it is clear that the knowledge of the general population with regards to diabetes and its risk factors is very low.

In looking at secondary prevention it is important to note that 67% of blindness is due to chronic diseases and old age.(23) There are no statistics for diabetes complications. During interviews and discussions with healthcare workers and specialists they were asked to estimate the percentage of patients with complications. From this the average were 28% for Retinopathy, 38% Neuropathy and 17% for foot ulcers. There were 40 reported amputations at the Hospital in Esteli in 2006.

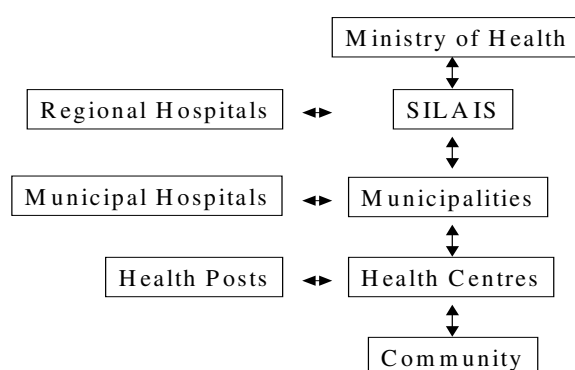
Brigadistas, who play an active role in community prevention have little role in the prevention of diabetes.

Nicaragua also has a nutrition policy that is being developed that includes aspects with regards to diabetes.

### 15. Registers and patient data

The current surveillance system does not include diabetes or NCDs. Its main purposes are to alert the authorities in case of epidemics, implement prevention programmes, planning and determine areas for prioritisation of health. This data is collected within the community and moves up the system all the way to MINSA as shown in the Figure below.

**Figure 16 – Surveillance system in Nicaragua**



This data is collected and put into weekly reports. There was mention that diabetes and other NCDs would be included in this system.

Registers and patient files were present and well kept in all facilities visited. Using these data on diabetes is collected at facilities through registers, both official and semi-ad-hoc. Data can be found at a central and SILAIS level with regards to all conditions, hospitalisations, mortality, consultations, etc. for diabetes. However, this is sometimes not coherent or a reflection of reality. For example reported total deaths at the MINSA Statistics office was 15,762 for all regions. This would represent an overall mortality rate of 3 per 1,000 for Nicaragua, when the WHO states that child mortality is 41 (male) and 35 (female) per 1,000 population and adult mortality is 214 and 151 per 1,000 population.(25)

Another problem encountered is the use of both patient numbers and consultations for diabetes sometimes amalgamating these numbers together. In acute/communicable diseases the total number of cases is important to know, and people can have more than one episode of a given condition. However, with diabetes it is important to know the exact number of people with this condition.

Also the use of the term Type 1 diabetes is often confused with a patient requiring insulin in registers and statistics.

## **16. Traditional Healers**

During meetings and interviews with patients none mentioned that they used traditional medicine. A few mentioned using a “Naturalista” (naturopath). However this was for overall well-being and not only diabetes. Very few doctors mentioned the use of traditional medicine by their patients.

## **17. Other Issues**

The most common formulation of Metformin in the private sector was 850 mg whereas in the public sector it was 500mg. Doctors should be aware of this when prescribing Metformin, especially if some tablets will need to be purchased in the private sector.

As mentioned above the following study did not include the Atlantic Coast and the Región Autónoma del Atlántico Sur (RAAS) and Región Autónoma del Atlántico Norte (RAAN) due to logistical reasons. It is known that access to care in these two regions is more difficult than in other areas of Nicaragua. From data collected both regions are included in statistics and receive insulin, syringes and other materials necessary for diabetes care. One child met during the assessment came from RAAS to receive her care in Managua. Clear region specific recommendations are impossible, without having assessed these areas properly, but the recommendations proposed below should be implemented in these regions taking into account their unique specificities.

## **18. Discussion**

The government of Nicaragua should be congratulated on the provision of free insulin and medication. The organisation of its chronic care and diabetes clubs can serve as a model for other countries. Overall these elements provide the foundations for diabetes care in Nicaragua, however due to a lack of resources many challenges remain. One such challenge is the organisation of care for people with diabetes as close as possible to their place of residence in conjunction with adapted education tools.

Diabetes already places a large financial burden on the health system. If the continuing increasing trends in prevalence of are not addressed effectively, this financial burden consume

larger and larger amounts of resources. For example if the data from MINSA is used the prevalence of diabetes is around 1-1.2%, whereas the estimate for Managua during the CAMDI study was 9% (32). Taking into account the population cared for in private and INSS facilities does not account for this entire gap. This means that there are a large number of people who are not diagnosed or cared for. It has been reported that the number of undiagnosed diabetes is one for every person diagnosed in the developed world and 1 diagnosed for every 8 undiagnosed in the developing world.(43) This again stresses the need for strengthening the health system and also reinforcing prevention.

In the past the RAPIA has served as a catalyst for change and raised the profile of diabetes with government authorities, clinicians and people with diabetes. Through previous work of the IIF(44, 45) 11 key elements are needed to create an environment that is able to address diabetes. These are:

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

The recommendations from the results presented above are presented within this framework. It is important to keep in mind that each of these recommendations cannot be implemented in isolation. For example, an increase in awareness of diabetes through a prevention campaign will inevitably lead to an increase in numbers of people diagnosed, which will have ramifications on the number of people attending consultations and needing medication. These recommendations are specific to diabetes, however for feasibility and rational use of scarce resources in Nicaragua, these can and should be applied to all NCDs in both the Public and INSS sectors. It should be noted that there are many examples from other Latin American countries that can be used as models for different aspects of implementing these recommendations. PAHO, IDF South and Central America Region and the Asociacion Latinoamericana de Diabetes provide good sources to assist Nicaragua developing different aspects of its programme with regards to diabetes.

## 19. Recommendations

	<b>Problem</b>	<b>Recommendation</b>
<b>1. Organisation of the Health System</b>	<ul style="list-style-type: none"> <li>- There is no specialised care for children with Type 1 diabetes outside of Managua</li> </ul>	<ul style="list-style-type: none"> <li>- Inclusion of Type 1 diabetes in chronic disease focal point's training</li> <li>- Focal point for chronic conditions responsible for children with Type 1 diabetes in each Municipality</li> <li>- Organisation of 1-2 yearly check-ups in Managua for all children with Type 1 diabetes covering costs of transportation</li> </ul>
	<ul style="list-style-type: none"> <li>- Guidelines for diabetes are not adapted and achievable in Nicaragua</li> <li>- Care varies from facility to facility</li> </ul>	<ul style="list-style-type: none"> <li>- Updating and standardisation of guidelines adapted with reality of the situation in Nicaragua</li> <li>- Distribution and training with regards to these guidelines</li> <li>- Development of a standardised checklist for each consultation adapted and achievable for level of the health system</li> </ul>
	<ul style="list-style-type: none"> <li>- Long waiting times and problems accessing specialists and internists at hospital</li> <li>- Problems with counter-referrals</li> </ul>	<ul style="list-style-type: none"> <li>- Ensure that hospital consultations are only used for specialised care and not routine care</li> <li>- Improve counter-referrals by developing a standardised care algorithm for when and how patients should be referred to Hospital and at the same time, referred back to the Health Centre</li> <li>- Organise yearly "diabetes" day(s) consultations at each Regional Hospital when all specialists are available for specialised checks with regards to diabetes</li> </ul>

	<ul style="list-style-type: none"> <li>- Large number of patients at Health Centres for each consultation</li> </ul>	<ul style="list-style-type: none"> <li>- Increase number of days of consultation</li> <li>- Within care algorithm, mentioned above, have patients come more or less frequently depending on their status</li> <li>- Increase role of nurses for patients with no complications</li> </ul>
<b>2. Data Collection</b>	<ul style="list-style-type: none"> <li>- Type 1 diabetes misrepresented as people with insulin-requiring diabetes</li> </ul>	<ul style="list-style-type: none"> <li>- Improve training for people responsible for statistics and surveillance with regards to diabetes</li> <li>- Increase education and motivation for proper data collection and classification of diabetes</li> </ul>
	<ul style="list-style-type: none"> <li>- Surveillance system does not include diabetes</li> </ul>	<ul style="list-style-type: none"> <li>- Inclusion of diabetes in surveillance system</li> <li>- Identify ways for surveillance system to notify patient numbers and not episodes or consultations</li> </ul>
	<ul style="list-style-type: none"> <li>- A lack of complete data with regards to diabetes exists</li> <li>- Registers and patient records were kept in all facilities, but amalgamation of this data is poor</li> </ul>	<ul style="list-style-type: none"> <li>- Development of standardised tool for data collection with regards to diabetes and associated complications</li> </ul>
	<ul style="list-style-type: none"> <li>- Other</li> </ul>	<ul style="list-style-type: none"> <li>- Improve training for people responsible for statistics and surveillance with regards to diabetes and surveillance of Non Communicable Diseases</li> <li>- Creation of a register of children with diabetes in each municipality</li> <li>- Use data to feed into planning for consultations, medicines, etc.</li> </ul>

<b>3. Prevention</b>	- No primary prevention programmes	<ul style="list-style-type: none"> <li>- Develop primary prevention programme in line with the situation in Nicaragua and its different socio-economic areas</li> <li>- Increased collaboration with PAHO's CARMEN and "Get moving America" campaign against obesity</li> <li>- School and community focus</li> <li>- Development of national policy</li> <li>- Involve Brigadistas and community health workers in discussing diabetes and its risk factors within the community</li> </ul>
	- No secondary prevention programmes	<ul style="list-style-type: none"> <li>- Increase training for healthcare workers</li> <li>- Increase patient education</li> <li>- Yearly specialised consultations for patients</li> </ul>

<b>4. Diagnostic tools and infrastructure</b>	- Problems with regards to availability and supply of testing strips and reagents in public sector	- Improve supply mechanisms for strips and reagents - Ensure all health centres have necessary diagnostic tools o Development of an adapted diabetes toolkit to be present at each level of the health system
	- Problems with availability of tools necessary for proper diabetes check-up	- Development of a diabetes toolkit to be present at each Health Centre
	- National referral laboratory's capabilities with regards to HbA1c are under utilised - Diagnosis and follow-up are mainly done with glucometers (capillary blood glucose measurements)	- Investigate feasibility of regular HbA1c checks for the largest number of patients possible
	- High cost for patients of self-monitoring equipment	- Investigate possibility of reintroducing urine testing and supplying people with urine test strips
	- Other	- Ensure that types of glucometers present in the Public sector are limited in order to limit the number of types of strips that need to be purchased, standardised and safe for multiple patient use - Education for healthcare workers and laboratory technicians for safe and proper use of diagnostic tools
<b>5. Drug procurement and supply</b>	- Some health centres do not have Rapid insulin for outpatients	- Ensure that if a patient requires Rapid insulin they are able to get it at Health Centre (NB this is where data on patients and their treatments can be useful in assisting the pharmacist in planning the right medications)
	- Other	- Investigate the feasibility of having MINSA and CIPS manage the supplies for INSS with regards to diabetes – rationale increase in quantity may lead to a decrease in price



<b>6. Accessibility and affordability of medicines and care</b>	- Syringes are not readily available in the Public sector and need to be bought in private pharmacies	- Link supply of syringes with insulin
	- Access to other medicines for diabetes related complications and other conditions is sometimes difficult for people with diabetes	<ul style="list-style-type: none"> <li>- Development of a basic package of medicines necessary for diabetes and related complications that are not included in current basic list and investigate feasibility of providing these (for example for the prevention of nephropathy, macroangiopathy, infections, etc.)</li> <li>- Ensure that after children and pregnant women people with diabetes are given priority access to other medicines</li> </ul>
	- Some health facilities do not provide the full quantity of required medicines	- Ensure that all health facilities fulfil the full prescription of doctor for diabetes, especially with regards to insulin
	- Insulin is not available at place of consultation	<ul style="list-style-type: none"> <li>- It would be ideal for patients to be able to get their insulin and medicines where they have their consultation. The reason for this not being currently possible is with regards to planning</li> <li>- Any improvement in this would be beneficial to limit patient expenses with regards to transportation and time</li> </ul>
	- Children need to go to Mascota in Managua to get their insulin	<ul style="list-style-type: none"> <li>- Register each child in Municipality where they are from</li> <li>- Ensure that child is able to get insulin at Health Centre in their Municipality</li> </ul>

<b>7. Healthcare workers</b>	- Lack of training for healthcare workers in diabetes and also patient education and management of long-term conditions	- Train chronic disease focal point in Type 1 and Type 2 diabetes care with a view of having them train their colleagues (“training of trainers”) - Develop standardised training material for nurses, laboratory technicians and other health professionals - Training for healthcare workers on how to teach patients and management of long-term conditions
	- Under utilisation of nurses	- New roles for nurses and other health professionals to lessen burden on doctors - Training with regards to these roles
	- Lack of specialised resources	- Training of nurses or other healthcare workers with regards to such specialities as diabetes educators, podiatrists, etc.
<b>8. Adherence issues</b>	- Problems with regards to adherence to dietary and lifestyle recommendations	- Improve patient education - Development of culturally adapted dietary guidelines
	- Self-medication	- Include this aspect in patient education
	- Patients need to go to Health Centre every month to get medicines	- Improve access to medicines so that patients do not need to go to Health Centre every month ○ Use recurring prescriptions ○ Use of chronic card
<b>9. Patient education and empowerment</b>	- Not standardised, will vary from facility to facility - No standardised tools or materials	- Development of tools adapted to the socio-economic situation in Nicaragua that are easy to use and culturally adapted - Organise education activities during consultation waiting times using televisions available in waiting rooms - Develop tools that are easy to use and understand, for example a diabetes cookbook that uses readily available, cheap and culturally acceptable ingredients

<b>10. Community involvement and diabetes associations</b>	- Optimise use of community involvement and clubs	<ul style="list-style-type: none"> <li>- Train members of clubs to be peer educators</li> <li>- Develop role of clubs as support group</li> <li>- Develop role of clubs as pressure groups for Municipal and Regional governments</li> <li>- Strengthen organisational capacity of clubs</li> </ul>
	- No National voice for diabetes in Nicaragua	<ul style="list-style-type: none"> <li>- Creation of National Council on Diabetes: <ul style="list-style-type: none"> <li>o This council becomes the Board of the national diabetes association</li> <li>o This council to include: government officials, clinicians (specialists and general practitioners), patients, nurses, nutritionists, specialists in communication, educators, urban planners, sociologists, anthropologists, etc.</li> </ul> </li> </ul>
	- Some patients view voluntary contribution to club as a payment for healthcare	<ul style="list-style-type: none"> <li>- Clearly explain to patients the reason for this contribution</li> </ul>
<b>11. Positive policy environment</b>	- Lack of a concrete, strong and overarching policy on diabetes	<ul style="list-style-type: none"> <li>- Development of a policy in line with the United Nations' Resolution on diabetes and including aspects such as: <ul style="list-style-type: none"> <li>o Free access to insulin and medicines</li> <li>o The role of clubs</li> <li>o Types of foods people are able to afford</li> <li>o The promotion of cash crops that have detrimental effects on what foods are available and affordable</li> <li>o Urbanisation and urban sprawl</li> </ul> </li> </ul>

## 20. Acknowledgements

Handicap International would like to acknowledge the financial support of Sanofi-Aventis in the implementation of this project.

The authors would like to sincerely thank Dr. Carlos Corea for his time and support without which this report would not have been possible. The following people's contributions and support during this project is gratefully acknowledged:

- Dr. Altamirano, PAHO
- Mr. Aragon Juarez and colleagues at the Ministerio de Fomento, Industria y Comercio
- Dr. Arreas and the staff at Hospital Roberto Calderon
- Dr. Benavides and the staff at the Centro de Salud Tipitapa
- Dr. Benavides, SILAIS Esteli
- Dr. Berrios, Cruz Red Cross
- Dr. Bolanos, FUNDPEC
- Dr. Caceres and colleagues at Puesto de Salud Ronaldo Arauz
- Dr. Castillo, Centro de Salud Pueblo Nuevo
- Mrs. Cuarda and the members of Asociacion de Padres de Ninos y Jovenes Diabeticos de Nicaragua
- Lic. Dominguez and colleagues at the Division General de Planificacion y Sistemas de Informacion, MINSA
- Dr. Granados
- Lic. Herdocia, CIPS
- Dr. Herrera and colleagues at Puesto de Salud Melania Florian
- Dr. Larga Espada, MINSA
- Dr. Lopez and colleagues at Puesto de Salud Oscar Gamez
- Dr. Matus and Dr. Valle and the staff at Hospital Infantil Manuel de Jesus Rivera
- Dr. Medina, Fundacion Nicaraguense para la Diabetes
- Dr. Mendoza and the staff at Centro de Salud Pedro Altamirano
- Dr. Narvaez, Centro de Salud Lionel Rugama
- Dr. Pastora, MINSA
- Dr. Pereira and colleagues at Puesto de Salud Eduardo Selva
- Dr. Pino and colleagues at Centro de Salud Lionel Rugama
- Dr. Rivas and colleagues at Centro de Pueblo Nuevo
- Dr. Sequeira, SILAIS Managua
- Dr. Suarez and the staff at Centro de Salud Socrates Flores
- Dr. Triminio and colleagues at SILAIS Esteli
- Dr. Trujillo and colleagues at Puesto de Salud Heroes y Martires
- Dr. Ubeda and colleagues at Hospital San Juan de Dios
- Dr. Villagra and the staff at Hospital Lenin Fonseca

Many thanks to Dr. Adilia Guadamuz for her help and support. Special thanks to the RAPIA teams:

- Managua:
  - o Carlos J. Aviles
  - o Ana Maria Perez Aguirre
  - o Isabel Zepeda Perez
  - o Dr. Edwin Isaguirre
  - o Juan Castillo
  - o Jorge Crespo
  - o Anielka Rodriguez

- Alex J. Lopez
- Juan Carlos Rojas
- Maricela Alvarez
- Orlando Jose Vargas
- Esteli and Pueblo Nuevo:
  - Anareysi Blandon Davila
  - Aleyda de Carman Zeledo Rivera
  - Martha Lopez Moreno
  - Kristhell Rebeca Acosta Urey
  - Edwin Antonio Palacios
  - Lebny Francisco Tourniel Ortega
  - Elias Gonzalez Lopez
  - Dr. Francisco Jose Soza Quiroz
  - Vilma del Carmen Corrales Escorcia

The support and guidance of the Trustees of the International Insulin Foundation, especially Professors Harry Keen and John S. Yudkin is gratefully acknowledged.

## Appendices

### Appendix 1 – Map of Nicaragua

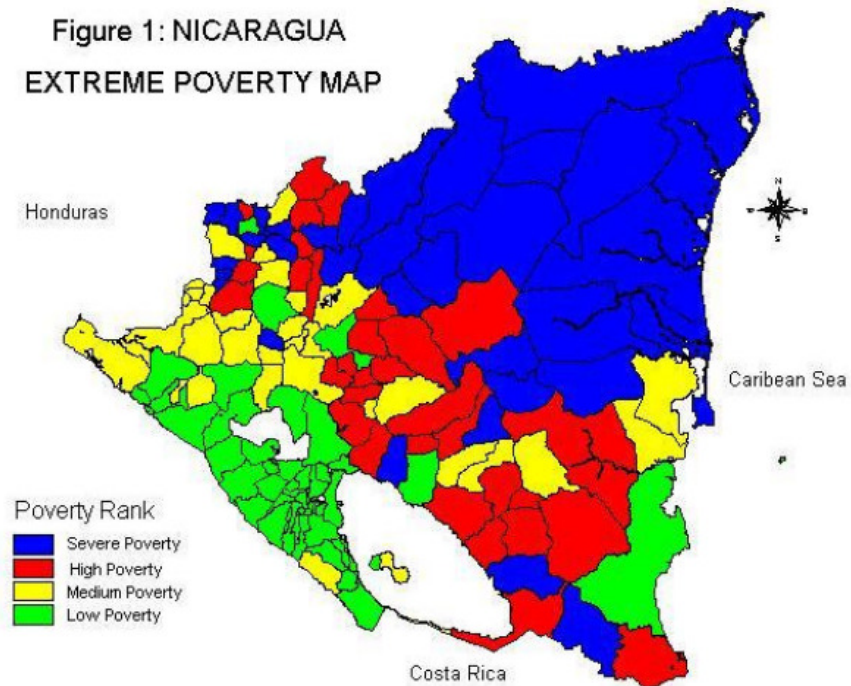
Figure 17 – Map of Nicaragua(46)



Areas where the RAPIA took place

## Appendix 2 – Poverty Map of Nicaragua(47)

Figure 18 – Poverty Map of Nicaragua



### Appendix 3 – Nicaragua basic statistics

**Table 19 – Population by age for both sexes in 2005**

<b>Population by age (years)</b>	<b>Percentage of both sexes</b>
0-4	11.8
5-9	12.5
10-14	13.3
15-19	11.4
20-24	10.5
25-29	8.0
30-34	6.6
35-39	5.7
40-44	4.8
45-49	3.9
50-54	3.1
55-59	2.3
60-64	1.8
65-69	1.4
70-74	1.1
75-79	0.8
80-84	0.5
85+	0.5

**Table 20 – Dependency ratio**

<b>Year of survey</b>	<b>1950</b>	<b>1963</b>	<b>1971</b>	<b>1995</b>	<b>2005</b>
0-14	43.3%	48.2%	48.1%	45.1%	37.5%
15-64	53.9%	48.9%	48.9%	51.4%	58.2%
65+	2.8%	2.9%	3.0%	3.5%	4.3%
<b>Dependency ratio</b>	<b>86</b>	<b>104</b>	<b>104</b>	<b>95</b>	<b>72</b>



**Table 21 – Percentage of population in different regions with no education**

Region	Percentage of population with no education
Boaco	32%
Carazo	14%
Chinandega	17%
Chontales	26%
Esteli	16%
Granada	14%
Jinotega	34%
Leon	16%
Madriz	25%
Managua	10%
Masaya	14%
Matagalpa	29%
Nueva Segovia	26%
RAAN	34%
RAAS	36%
Rio San Juan	34%
Rivas	15%

**Appendix 4 – Number of interviews, meetings and discussions for the RAPIA in Nicaragua**

**Table 22 – Number of interviews, meetings and discussions for the RAPIA in Nicaragua**

Area	Patients	Pharmacy (Private and Public)	Laboratories (Private and Public)	Healthcare workers	Health Facilities (Private and Public)	Regional level	National level
Managua	63	14	13	24	20	4	17
Esteli	26	17	9	26	15	4	
Pueblo Nuevo	5	3	1	2	1		
<b>Total</b>	<b>94*</b>	<b>34</b>	<b>23</b>	<b>52</b>	<b>36</b>	<b>8</b>	<b>17</b>

**\* – Characteristics of patients interviewed during the RAPIA**

- 31 people can be classified as having Type 1 diabetes (diagnosis before the age of 30, and needing insulin)
- 57 people can be classified as having Type 2 diabetes (diagnosed after the age of 30)
- 6 could not be classified or discussions with these people was for other information
- 40% from rural areas, 60% from urban areas
- Male: 37% Female: 63%

## Appendix 5 – Details of calculations for Table 7

**IDF estimate:** The IDF estimates there are a total of 216,800 people with Type 2 diabetes. This number of divided equally for each sub-population detailed in Table 7. The same was done for the 1,300 people with Type 1 diabetes. The IDF calculates its estimates through identifying publications of prevalence in each region. If a country does not have any data, data from a country with similar ethnicity and economic circumstances is used. These prevalence rates are then applied to the population of the country with respect to age and if they are urban or rural. An urban to rural ratio of 2:1 is used. For Type 1 diabetes Incidence is calculated from published studies. If countries do not have any published data from a c country with similar ethnicity and economic circumstances is used.

**CAMDI estimate:** The CAMDI study determined a prevalence of 9% for Managua. The IDF uses urban populations divided by 2 for rural populations (4.5%). These respective rates of prevalence were applied for the total population of Nicaragua.

**MINSA data:** This information was obtained from each SILAIS or MINSA directly from either statistics collected, registers or the MINSA statistics office.

**NPH insulin estimate:** This estimate was calculated by taking the total quantity of insulin ordered and dividing by 13(37) to obtain the total number of people with insulin-requiring diabetes. This value of 13 is based on 35 units of insulin per day, which is just less then 1 vial per month (1 vial = 1,000 units = 28.6 days = 13 vials per year). Based on the data from the RAPIA 44% of patients classified as having Type 2 diabetes used insulin. Using this information and the division of 5% Type 1 diabetes and 95% Type 2 diabetes these numbers were calculated.

**RAPIA estimate:** The number for the Esteli municipality and Pueblo Nuevo was based on interviews in these two areas on the number of people with diabetes. It was assumed that there was no overlap between different facilities. The estimate for Managua region used data collected from interviews, as well as statistics and insulin requirements. Again no overlap between facilities was assumed. For the estimate for all of Nicaragua, the rate determined by the RAPIA in Esteli\* was used as the rate for the rural population and the rate determined in Managua for urban population. These rates were then applied to the percentage of the urban and rural population in each region of Nicaragua to obtain a total number of people with both Types of diabetes.

\* - The rate for Pueblo Nuevo was not used as it was seen as high and not necessarily representative of all rural areas.

## Appendix 6 – List of registered types of insulin in Nicaragua

Commercial name	Company
Insuman comb 75N/25R 100 IU/ml suspension	Aventis Pharma
Insuman N	Aventis Pharma
Insuman R 100 IU/ml	Aventis Pharma
Lantus 100 IU/ml	Aventis Pharma
Mixtard 30HM	Novo Nordisk
Novolin 70/30	Novo Nordisk
Novolin R	Novo Nordisk
Novomix 30 Flexpen 100IU/ml	Novo Nordisk
Novorapid 100 IU/ml	Novo Nordisk
Novorapid Flexpen 100 IU/ml	Novo Nordisk
Apidra 100 IU/ml	Aventis Pharma
Clonsulin-R	Soperquimia
Closulin-N	Soperquimia
Humalog	Eli Lilly
Humalog Mix 25	Eli Lilly
Humulin	Eli Lilly
Humulin R 100 IU/ml	Eli Lilly
Humulin 70/30	Eli Lilly
Humulin L	Eli Lilly
Humulin N	Eli Lilly
Humulin N 100 IU/ml	Eli Lilly
Humulin R 100 IU/ml	Eli Lilly
Insulin NPH 100 IU/ml (Bovine)	Soperquimia
Insulin NPH Lilly (Bovine)	Eli Lilly
Regular Rapid Insulin (Bovine)	Soperquimia
Insuman Comb	Aventis Pharma

Where not indicated the insulin is human.

## Appendix 7 – MINSA Diabetes Protocol

	Start of treatment	Every 3 months	Annual
Complete clinical history	X		X
Update of clinical history		X	
Evolution of problems and new events		X	
Complete physical exam	X		X
Height	X		X
Weight and BMI	X	X	X
Waist measurement	X	X	X
Blood pressure	X	X	X
Peripheral pulses	X		X
Foot inspection	X	X	X
Sensitivity of feet	X	X	X
Knee and plantar reflexes	X		X
Eye exam with dilated pupil	X		X
Eye test	X		X
Dental check-up	X		X
Glycaemia	X	X	X
Recommend to do an HbA1c	X	X	X
Lipid profile	X		X
EGO	X	X	X
Microalbuminuria	X		X
Creatinin	X		X
Electrocardiogram	X		X
Stress test	X		X
Education course on diabetes	X		X
Reinforcement of knowledge and update		X	
Psychosocial evaluation	X		X

## **Appendix 8 – Priority themes for education session in Chronic Clubs**

- Themes related to the specific condition
  - Anatomy – affected organs
  - Physiology of the condition
  - Clinical signs
  - Signs of complications
  - Management and treatment of the condition
- Care for complications
  - Feet
  - Eyes
  - Kidneys
- Techniques for self care
  - Feet
- Diet
  - Which foods to eat
  - Preparation of meals
  - Use of calories tables
- Promotion of healthy lifestyles
  - Exercises
  - Healthy living
- How to use medicines and equipment
  - Glucometers
- Interpersonal relations
- Self-assessment

## References

1. World Health Organization. Welcome to the diabetes programme, World Health Organization, 2006. <http://www.who.int/diabetes/en/> (accessed 7 March 2007)
2. United Nations General Assembly. World Diabetes Day. New York, United Nations, 2006.
3. International Diabetes Federation. About insulin, International Diabetes Federation. <http://www.idf.org/home/index.cfm?unode=1DA26AAB-E840-4F76-B399-EDE131A4C2E7> (accessed 6 February, 2007)
4. Aschner, P. Diabetes trends in Latin America. *Diabetes Metab Res Rev.* 18 (Suppl 3): S27-31. (2002).
5. International Diabetes Federation. International Diabetes Federation Diabetes Atlas 3rd Edition. Brussels, International Diabetes Federation, 2006.
6. Carrasco, E. et al. Increasing incidence of type 1 diabetes in population from Santiago of Chile: trends in a period of 18 years (1986-2003). *Diabetes Metab Res Rev.* 22 (1): 34-7. (2006).
7. Barcelo, A. et al. The cost of diabetes in Latin America and the Caribbean. *Bull World Health Organ.* 81 (1): 19-27. Epub 2003 Mar 11. (2003).
8. Pan American Health Organization and World Health Organization. 47th Directing Council 58th Session of the Regional Committee. Washington D.C., Pan American Health Organization and World Health Organization, 2006.
9. Popkin, B.M. The nutrition transition and obesity in the developing world. *J Nutr.* 131 (3): 871S-873S. (2001).
10. Uauy, R. et al. Obesity trends in Latin America: transiting from under- to overweight. *J Nutr.* 131 (3): 893S-899S. (2001).
11. Pan American Health Organization. The WHO Global Strategy on Diet, Physical Activity, and Health (DPAS), Implementation Plan for Latin America and the Caribbean 2006-2007. Washington D.C., Pan American Health Organization, 2006.
12. World Health Organization. Sedentary lifestyle: A Global Public Health Problem. Geneva, World Health Organization, 2002.
13. World Health Organization. Diet, Nutrition and the Prevention of Chronic Disease, Report of a Joint WHO/FAO Expert Consultation. Geneva, World Health Organization, 2003.
14. Burrow, G.N., Hazlett, B.E. and Phillips, M.J. A case of diabetes mellitus. *N Engl J Med.* 306: 340-343 (1982).
15. Barclay, E. Responding to the Diabetes Epidemic in Latin America: Helping Diabetics Help Themselves, Disease Control Priorities Project, 2006.
16. Pan American Health Organization. Promoting Better Health for People with Diabetes—DOTA: Declaration of the Americas on Diabetes, Pan American Health Organization, 2004.
17. Pan American Health Organization. About the CARMEN Initiative, Pan American Health Organization. <http://www.paho.org/English/HCP/HCN/IPM/cmn-about.htm> (accessed 3 March 2007)
18. Pan American Health Organization. A comer sano, a vivir bien y a moverse America!, Pan American Health Organization, 2007.
19. Beran, D, Yudkin JS and de Courten M. Assessing health systems for insulin-requiring diabetes in sub-Saharan Africa: developing a 'Rapid Assessment Protocol for Insulin Access'. *BMC Health Services Research.* 6 (1): 17 (2006).
20. United Nations Development Programme. Human Development Report 2006. New York, United Nations Development Programme, 2006.

21. Central Intelligence Agency. Nicaragua Country Profile, Central Intelligence Agency, 2007. <http://www.cia.gov> (accessed 26 January, 2007)
22. Salario Mínimo Vigente. *La Prensa*. Managua, 2007, pp. 9A.
23. Ministerio de Salud. Plan Nacional de Salud. Managua, Ministerio de Salud, 2004.
24. Instituto Nacional de Estadísticas y Censos. Encuesta de Medición del Nivel de Vida 2001. Managua, Instituto Nacional de Estadísticas y Censos, 2001.
25. World Health Organization. Core Health Indicators - Nicaragua, World Health Organization, 2006.
26. Ministerio de Salud. Política Nacional de Salud. Managua, Ministerio de Salud, 2006.
27. República de Nicaragua. VIII Censo de Población y IV de Vivienda. Managua, República de Nicaragua, 2006.
28. Instituto Nacional de Estadísticas y Censos. Encuesta Nicaraguense de Discapacidad. Managua, Instituto Nacional de Estadísticas y Censos, 2003.
29. Pan American Health Organization. Profile of the health services system of Nicaragua. Washington DC, Pan American Health Organization, 2002.
30. Acción Internacional por la Salud. Venta Social de Medicamentos. Managua, Acción Internacional por la Salud, 2006.
31. República de Nicaragua. Ley General de salud. Managua, República de Nicaragua, 2003.
32. Barcelo, A. Informe de Progreso: Iniciativa Centroamericana de Diabetes. Ciudad de Panamá, Pan American Health Organisation, 2006.
33. Ministerio de Salud. Lista de Medicamentos Esenciales. Managua, Ministerio de Salud, 2001.
34. Ministerio de Salud. Formulario Nacional de Medicamentos. Managua, Ministerio de Salud, 2005.
35. Ministerio de Salud. Protocolo de atención de la Diabetes Mellitus. Managua, Ministerio de Salud.
36. Quality of Diabetes Care in Central America - Preliminary Analysis. Panama City, Pan American Health Organization, 2006.
37. Yudkin, J.S. Insulin for the world's poorest countries. *Lancet*. 355: 919-21 (2000).
38. Dirección General de Servicios de Salud. Lista Básica - Material de Reposición Periódica. Managua, Ministerio de Salud, 1999.
39. Dirección General de Servicios de Salud. Lista Básica - Reactivos y Material de Reposición Periódica de Laboratorio Clínico y Patología. Managua, Ministerio de Salud, 1999.
40. Jeppsson JO et al. Approved IFCC reference method for the measurement of HbA1c in human blood. *Clin Chem Lab Med*. 40 (1): 78-89 (2002).
41. Ministerio de Salud. Guía Metodológica de Organización y Funcionamiento de los Clubes de Pacientes con Enfermedades Crónicas no Transmisibles. Managua, Ministerio de Salud, 2002.
42. Bolanos Cuarezma, F. *Un Grano de Azúcar para el Diabético*. Managua, FUNDPEC, 2000.
43. Diamond, J. The double puzzle of diabetes. *Nature*. 423: 599-602 (2003).
44. Beran, D. and Yudkin, JS. Diabetes Care in sub-Saharan Africa. *The Lancet*. 368 (9548): 1689-95 (2006).
45. Beran, D. The Diabetes Foundation Report on implementing national diabetes programmes in sub-Saharan Africa. London, International Insulin Foundation, 2006.
46. Office of the United Nations High Commissioner for Human Rights. Map of Nicaragua, Office of the United Nations High Commissioner for Human Rights, 2004. <http://www.ohchr.org/english/countries/maps/nicaragu.pdf> (accessed 12 March 2007)

47. Government of Nicaragua. A Strengthened Growth and Poverty Reduction Strategy. Managua, Government of Nicaragua, 2001.