Health of Populations in Transition (HoPiT)
Research Group — Cameroon

Cameroon Burden of Diabetes (CamBoD) Project

Baseline Survey Report

SUMMARY

CamBoD
Cameroon Burden of Diabetes Project

MSP

World Diabetes Foundation

Cameroon — 2004

Executive Summary

A.BACKGROUND

Non-communicable diseases (NCDs), such as diabetes and cardiovascular disease, are becoming increasingly important as causes of mortality and morbidity in all developing countries. In sub-Saharan Africa, communicable diseases continue to have the greatest disease burden but it is estimated that by 2020, NCDs will outstrip communicable diseases as a cause of death (Murray and Lopez, 1997).

According to WHO estimates, 190 million people suffer from diabetes worldwide and it is estimated that by the year 2025, there will be about 330 million patients in the world. This is driven by a combination of demographic change (populations with older age structures), increasing urbanization (WHO 1998) and associated changes in risk factor levels, such as tobacco smoking, obesity and physical inactivity (Astagneau et al. 1992; Pavan et al. 1997; Kaufman et al. 1999; Hunter et al. 2000).

Studies conducted in Cameroon in 1994 and 1998 showed that age, obesity and hypertension were significantly associated with hyperglycemia. Diabetes was highly associated with a family history of diabetes and cardiovascular diseases.

There is little systematic collection, analysis, reporting, dissemination and use of data on non-communicable diseases for policy and decision-making to guide interventions on prevention and control.

Evidence-based data on which an appropriate and effective strategy for the prevention, control and surveillance of NCDs is not available to put in place a National Diabetes Control programme in Cameroon. Evidence based comprehensive strategies are therefore required by policy makers to address this expanding epidemic.

It is for this reason that the Health of Populations in Transition Research Group, (HoPiT) Cameroon, in collaboration with the World Diabetes Foundation (WDF) and the Ministry of Public Health, decided to undertake this project as a prelude to a future nation wide national NCD Control Programme.

STUDY AIMS AND OBJECTIVES OF THE CAMBoD PROJECT AND THE BASELINE SURVEY

The goal of the CAMBoD project is to build a multidisciplinary programme that will contribute to the surveillance, prevention and control of diabetes and serve as a model for other NCD programmes in Cameroon and other countries in the region.

AIMS

To undertake a 5-year programme that will:

1. Provide scientific new knowledge to guide the prevention and control of diabetes,
2. Influence the development of national and regional policy for surveillance, prevention and control of diabetes,
3. Build local and regional capacities relevant to epidemiological surveillance, prevention and control of diabetes.

OBJECTIVES OF CAMBoD

There are three areas covered by the project:

1. Surveillance of diabetes and its risk factors

- To establish a national surveillance system based on sentinel sites for diabetes and its risk factors.
- To determine the importance of known and putative risk factors for diabetes in adult men and women in Cameroon.

2. Prevention of diabetes

- To document, inform and influence national prevention policies.
- To develop, implement and evaluate district diabetes prevention demonstration projects.

3. Control

- To develop effective interventions appropriate for the management of diabetes and for the organization and delivery of health care for diabetes in Cameroon.
- To Explore the knowledge, practices, attitudes and beliefs (KPAB) of both patients and health care staff on diabetes and based on these, devise and implement approaches to improving treatment concordance.
- To review the overall functioning of the health care system within Cameroon and identify opportunities and barriers to the effective control of diabetes.

OBJECTIVES

The main objective of the qualitative component of the baseline study was

BASELINE SURVEY OBJECTIVES

To carry out this project it was but normal that a baseline assessment is conducted to obtain data on which project intervention activities will be evaluated. The objectives of the baseline survey were thus, as follows:

1. To find out the current prevalence of diabetes and their risk factors in Cameroon.
2. To probe into underlying beliefs, perceptions and behaviours that can enable us understand and analyse population-based data on health beliefs relative to diabetes and lifestyle factors such as: patterns of food consumption, physical activity, obesity, smoking, and alcohol consumption.
3. To investigate the situation of our health facilities with respect to health care delivery for diabetes and its complications, human resources, drugs, equipment, laboratory etc.
4. To obtain baseline data on which project intervention activities will be evaluated during the life span of the project.

This report thus presents the findings of the baseline survey, which is the first phase of the project that sets the bases of the second (intervention) phase.

METHODOLOGY

This baseline study was a cross sectional survey that ran for four months (July to October, 2003). It was conducted in four urban sentinel sites of Cameroon selected purposively from each of the four ecological zones of the country. For this project, an urban health district, with all its health areas was considered the unit of a sentinel site and was selected based on the criteria of accessibility and population.

a. Sentinel sites

The Coastal Zone	Cité des Palmiers Health district
Sahelian Zone	Garoua Urban health district
Forest Zone	Biyem Assi health district
High Plateau Zone	Bamenda health district

b. Study population

The study population was Cameroonian men and women aged fifteen years and above, living in urban communities.

c. Sample size and sampling technique

The WHO STEPS-wise approach for collecting surveillance data for non-communicable diseases (NCDs) was used to collect prevalence data for diabetes, hypertension and their risk factors. According to this approach we need at least 250 adults of both sexes for every 10-year age group interval per site (WHO recommendation).

In the context of this project, and using Epitable calculator in Epi Info, the sample size was calculated using the following criteria:

Desired precision: 1.5%

Expected prevalence: 4%

Design Effect: 3.75%

This gives a **sample size of 2460 subjects per sentinel site** (cluster).

From 15 to 64 years, the population was divided into ten-year age groups: 15 – 24; 25 – 34; 35 – 44; 45 – 54; and 55 – 64. Then, the 65 years and above range constituted an extra group. This was because above 65 years, the population size within individual 10-year age groups is small.

Thus we had 6 ten-year age groups with a sample size of **2460/6 = 410 subjects per age group.**

This gave a total sample size of at least **9840 subjects** for the four sites (2460 X 4).

Making up for a possible non-response rate of about 10 %, we therefore needed a sample of **10 824 subjects.**

The sampling scheme employed was a multilevel systematic sampling stratified by age group and the sampling unit was households.

The survey was preceded by a census, during which all the households in the health area were enlisted and all the adults aged 15 years and above registered.

The total number of subjects within each age group was determined. This was used to calculate the approximate percentage distribution of each age group in the total population.

This population percentage for each age group was then used to determine the percentage of households for each age group in which the census population was found.

The number of households obtained for each age group was divided by 410 to obtain the sampling interval.

The first household was selected randomly and individual age group sampling intervals were then used to obtain the households from which all the subjects were obtained. This gave a special representation of the sample for every age group and avoided the risk of quickly obtaining the sample size of the most populated age group within a very limited spatial surface.

For the healthcare provider, a health services baseline assessment was undertaken by the direct interview of key members of the primary healthcare services. Informants were selected purposively from among frontline healthcare staff in 62 out of about 100 health facilities covering the 4 project sites. Informants were interviewed using a semi-structured interview guide. Reported data from informants was triangulated with

evidence from informal consultations with other health facility staff, observations and a health facility audit questionnaire.

For the community interviews, informants were selected purposively and according to category: patient, community informant or traditional healthcare provider (THP). An unstructured interview guide with open-ended questions was used. Interview guides addressed the following: awareness of diabetes, knowledge of risk factors, signs and symptoms and complications of diabetes, health beliefs about causation and prevention of diabetes, treatment seeking behaviour, referrals, etc. On the overall, 104 in-depth interviews were conducted. All interviews were tape-recorded, transcribed and analysed qualitatively using Ethnograph version 5.

d. Data collection methods and tools

Data was collected using the WHO STEPS adapted tool, (questionnaires, anthropometrical measurements, biochemical analysis), in-depth interviews and health facility audit forms.

- **WHO STEPS instrument (Version 1.3)**

This is an instrument developed by WHO for collection of surveillance data on NCDs and their risk factors. It was adapted for the CAMBoD project with respect to local specifications. It is made up of three main sections, namely:

- **Questionnaire (step 1 of STEPS)**

It was used to collect socio-economic and demographic data on diabetes and its risk factors (tobacco, alcohol, nutrition, physical activity).

- **Anthropometrical measurements (Step 2 of STEPS)**

These anthropometrical measurements included weight, height, waist and hip girths and blood pressure. These measurements were done using standardized methods.

Body weight in light clothes was measured to the nearest 0.1 kg using a Sohenle scale and the height to the nearest 0.5 cm using a portable stadiometer.

Waist circumference, taken midway between the lowest rib and the iliac crest and hip circumference at the level of the greater trochanters was measured to the nearest mm using a flexible tape.

An electronic AND 0 78 Model UA-767 fully automatic, clinically validated digital BP monitor (A & D company Tokyo Japan) was used to assess the blood pressure

according to standardized techniques and using suitable sized cuffs at the forearm, patients sitting, following the manufacturer's instructions. Small (9x18 cm), medium (12x23 cm) and large (15x33 cm) cuffs were used as appropriate.

Graduated and standardized stadiometers were used to take the heights of the subjects, standing upright on a flat surface without shoes and the back of the heels and the occiput on the stadiometer.

- **Biochemical measurements (Step 3 of STEPS)**

Every subject was visited between 5:30 a.m. and 9:00 a.m. on the day of appointment for the measurement of fasting capillary blood glucose using the HemoCue® B-Glucose Data Management Analyser. For every subject with an abnormal FCG (≥ 110 mg/dl or 6.1 mmol/l FCG), an oral glucose tolerance test (OGTT) was done to confirm the diagnosis of diabetes and identify cases of impaired glucose tolerance (IGT).

e. Data collection procedure (field work)

Census (registration) of eligible individuals per site

A household census was done for each of the selected health areas of the districts with registration of subject 15 years and above. The census forms were then entered in to the computer and analyzed using the Epi info version 6.0 software.

From the results, the sampling intervals for the different age groups were calculated and used in the course of the administration of the household questionnaire to determine the respective households.

Administration of household questionnaire and examination of subjects

In every selected household, all the subjects in it that fell within that age group were identified. The selected subjects were administered a questionnaire, (step 1 of STEPS) and physical parameters taken, weight, height, waist and hip circumferences and BP (step 2 of STEPS) and fasting capillary glucose with OGTT if necessary (step 3 of STEPS). On the first day of data collection, the whole team went out into the community to administer the questionnaire and do the anthropometrical measurements. Then, they took appointments for the following day between 6 a.m. and 9 a.m. for the fasting blood glucose.

On the subsequent days, each team was split into two groups; one in charge of administering the questionnaires and taking the physical examinations and the other doing the fasting blood glucose.

f. Data management

Qualitative data was analysed using Ethnograph version 5. All interviews (key informant and in-depth) were tape recorded and transcribed. Transcribed data was checked for completeness and internal coherence. Then, a coding scheme was drawn up such that key variables and themes from transcripts were identified, defined and classified into code trees. In the follow-up analysis, coded data was used to convey levels of knowledge relative to diabetes and its risk factors, portray mainstream health beliefs and indicate the distribution of views on health seeking practices and attitudes. Finally a content analysis technique was applied whereby categorical information served as a basis for deductive conclusions.

Development of data entry masks

The data manager for the CAMBoD project developed a data entry program, (CAMBoD Data Entry Program 1.0), an electronic format of the Steps 1.3 instrument, designed on an Epi6 plate form. For security and simplicity purposes, the program requires a password for login and allows direct access to data input masks from drop down menus. Data entry was highly checked by the program to minimized entry errors. Input masks were developed for each of the tools in respect to the tools designed for data collection. Data entry clerks were recruited and trained by the data manager on the use of the software.

g. Analysis

All analyses were performed with the use STATA 6.0. Age specific prevalence was reported for each age group, per site. Due to the complex sampling design of the survey, the overall proportions of diabetes, hypertension and obesity were estimated taking the stratified sampling design into consideration; (sentinel site as primary sampling unit and age groups as strata). The fact that the data did not have approximately equal proportions on each stratum required that the observations contributed by each record in the sample must be weighted for its differential probabilities of selection. Proportional weights for each stratum were attributed according to the inverse of the probability of each individual observation in that age group of being sampled from the corresponding age group in the census population

(e.g.: number in the stratum in the population/number in the same age group in the sample). The resulting weights were recorded in a new variable (weighting variable). In STATA 6, survey proportions were estimated using the ***svy*** command after having set PSU (Primary Sampling Unit) to sentinel site, strata to age group and weight (Proportional weight) to the weighting variable.

For international comparability, the prevalence of diabetes, hypertension and obesity for each site was estimated after direct standardization for age using the WHO New World Population as a reference. Comparison of proportions within groups was done using the Z test. Comparison of means between males and females in specific age groups was done using the Student's t-test and the p-value was adjusted by Bonferroni correction method. The null hypothesis of equality between factors was considered.

Crude and age adjusted population attributable risk (PAR) for hypertension and diabetes with some risk factors were calculated using the ***aflogit*** command in stata. This command calculates the PAR using the regular formula, with the assumption of equal prevalence for cases and control. Odd ratio from the logistic regression is used as an estimate of the relative risk.

The level of significance of p-value was set at 0.05.

The results are presented as graphs and tables.

RESULTS

Presented as quantitative (household survey and health facility audit) and qualitative (in-depth interviews) data.

1. COMMUNITY BASED HOUSEHOLD SURVEY

The survey results are presented in three main parts with respect to the WHO STEPS step 1, 2 and 3. These include the general characteristic of the study population, the socio-demographic variables, risk factors, physical parameters, and biochemical data

A. SOCIO-DEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION

1. The census population

25 000 individuals were registered in three of the four sites. It was not possible to carry out the census in Garoua before collecting the data because of the Ramadan. However, since the essence of the census was to determine the sampling intervals per age group, and because the census results obtained from the Biyem Assi, Cités des Palmiers and Bamenda sites were consistently similar, they were thus applied directly to the Garoua site.

Ten thousand and eleven individuals, 15 years and above (15 – 99), from 4189 households, participated in the study. Each site contributed for approximately 25% of the total study sample. The mean number of subjects per household was 3.

It will be realized that the 10011 subjects examined were above the calculated sample size of at least 9 860 subjects.

Table 1: Distribution of Respondents by sentinel site and by age group

Age group (Years)	Sites									
	Biyem Assi		**C. des Palmiers**		**Bamenda**		**Garoua**		**Total**	
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**
	23.71	2374	25.56	2559	25.78	2581	24.94	2497	**100**	**10011**
15 – 24	24.5	581	36.60	936	38.60	998	31.16	778	**33.00**	**3293**
25 – 34	28.13	682	18.25	467	25.00	645	25.40	634	**24.25**	**2428**
35 – 44	19.30	458	19.00	483	15.70	405	19.50	486	**18.30**	**1832**
45 – 54	6.20	394	13.33	341	8.60	222	11.00	272	**12.30**	**1229**
55 – 64	6.99	166	6.17	158	6.70	173	7.77	194	**6.90**	**691**
≥ 65	3.92	93	6.80	174	5.35	138	5.30	133	**5.35**	**538**

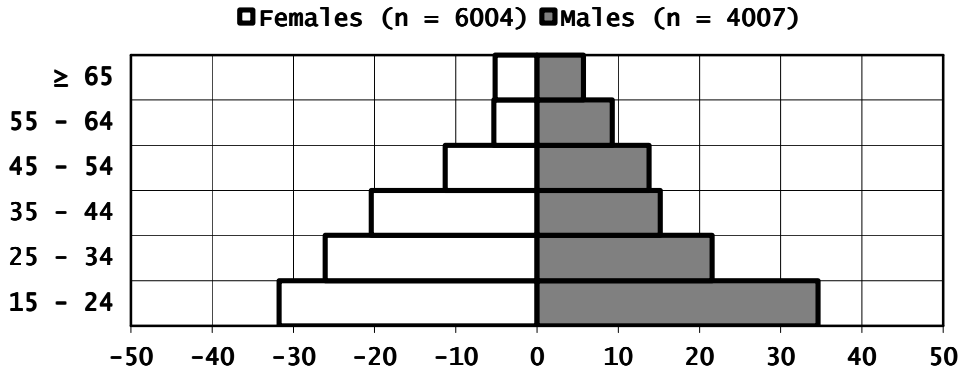
2. Sex distribution of respondents

Of the 10 011 respondents who took part in the survey, 60% were females and 40% males.

3. Age distribution

The age group distribution of the sample had a standard stepwise decrescendo structure; typical of developing countries' population pyramid as shown in fig. 1 below. Generally, the mean age in each age group tends to be the same for men and women.

Figure 1: Age distribution of respondents



4. Profession

A majority of the respondents performed household chores or a sort of self-employment that generally was very modestly remunerated

5. Level of education

A substantial proportion of the respondents in the Garoua site had no formal education (45%), as compared to the Biyem Assi site (3.91%). Generally, the level of education of the respondents was quite low, with close to 60% of them having had only primary level education.

B. ASSESSMENT OF RISK FACTORS FROM QUESTIONNAIRE (Step 1 of STEPS)

1. Tobacco consumption

The age and sex adjusted proportion of respondents reporting a history of cigarette consumption (having smoked at least once in life) was 14.79%.

Daily smokers represented 4% of the general population, 8% of the male population and 1% of the female population.

Table 2: Prevalence of daily smoking in the general population, per site and by sex

	Biyem Assi	Cité des Palmiers	Bamenda	Garoua
N	98	135	109	121
Prevalence [a]	4.42	5.92	4.73	5.05
Prevalence [b]	3.86	5.40	4.68	4.55

Prevalence of daily smoking in the general population [c]	
Men	**8.21**
Women	**1.02**
Total	**4.00**

[a] Age standardize using WHO New World Population
[b] Age and sex adjusted
[c] Estimated taking into account the stratified sampling procedure

2. Alcohol consumption

Alcohol consumption was a widespread phenomenon, with 84% of the respondents reported to have taken at least an alcoholic drink during the last 12 months.

Table 3: Percentage distribution of respondents who took at least one alcoholic drink during the last 12 months per site

	Biyem Assi	Cité des Palmiers	Bamenda	Garoua	National
Reporting [a]	85	87	84	75	82.75
Reporting [b]	86	88	85	78	84.25

[a] Age standardized using WHO New World Population
[b] Age and sex adjusted

Table 4: Percentage distribution of respondents who took at least one alcoholic drink during the last 12 months by sex

Men	89
Women	82
Total	**85**

Beer represented 84% of all the types of alcoholic drink consumed with Cité des Palmiers (94%) having the highest consumption rates and Garoua the lowest (59%).

Mean alcohol expenditures averaged 827 Fcfa (about $2) spent per day per household, with a maximum mean expenditure found in Yaoundé.

Approximately 11% of the respondents claimed to be daily drinkers (5 or more days a week) while about 30% were occasional drinkers (less than once a month).

3. Physical activity

Physical activity was assessed at work place and during leisure time.

Physical activity at work place: The majority of participant, after adjusting for profession and sex, declared working while mostly in a sitting position, with little or no physical activity at job site. Among those not sedentary at work, approximately half of them, regardless of age group, reported some vigorous activities related to work patterns (see table 35).

Table 5: Percentage distribution of respondents reporting no physical activity at job site, per age group, per site (Sedentary at work.)

Age groups (Years)	Sites									
	Biyem Assi		Cité des Palmiers		Bamenda		Garoua		Total	
	n	%	n	%	n	%	n	%	n	%
15 – 24	475	67.04	792	76.54	812	72.80	632	79.36	2711	74.65
25 – 34	503	70.40	354	77.25	470	72.00	499	78.90	1826	73.70
35 – 44	342	76.44	377	68.20	236	56.20	363	77.93	1318	75.20
45 – 54	296	71.02	258	56.36	133	50.15	192	71.23	879	69.40
55 – 64	123	68.86	117	58.70	113	48.10	130	71.10	483	65.22
≥ 65	65	54.40	139	55.60	97	46.54	106	67.43	407	68.20

Percentages adjusted for profession and sex.

Physical activity at leisure time: The analysis of physical activity at leisure time reveal that about 90% of the respondents were physically inactive (see table 31).

4. Nutrition

Fruit consumption

In general, respondents consumed fruits on an average of two days per week with the greatest quantity being consumed in Garoua and the lowest in Cité des Palmiers.

The mean expenditure on fruit consumption per household per week was 760 Fcfa (50 – 5000 Fcfa) or about US$1.5.

Vegetable consumption

Most of the respondents ate vegetables 3 days per week on an average. Vegetables seemed to constitute the basis of food intake of the population in Garoua as compared to Yaoundé or Cité des Palmiers. The average expenditure on fruits per household per week was 1200 Fcfa (100 to 16000 Fcfa)

Cooking oil

Regarding cooking oil, predominantly vegetable oils were used. In the Garoua site, mainly groundnut, cottonseed, or Soya bean oils were consumed as compared to the southern sites where mainly palm oil was used for cooking.

C. ANALYSIS OF STROKE

Prevalence data on stroke was estimated from verbal declarations of the respondent. This prevalence was estimated to be closer to 1% in the general adult population. Stroke was reportedly high in known hypertensive patients and even higher in those who were on treatment.

D. ANTHROPOMETRICAL MEASUREMENTS (Step 2 OF STEPS)

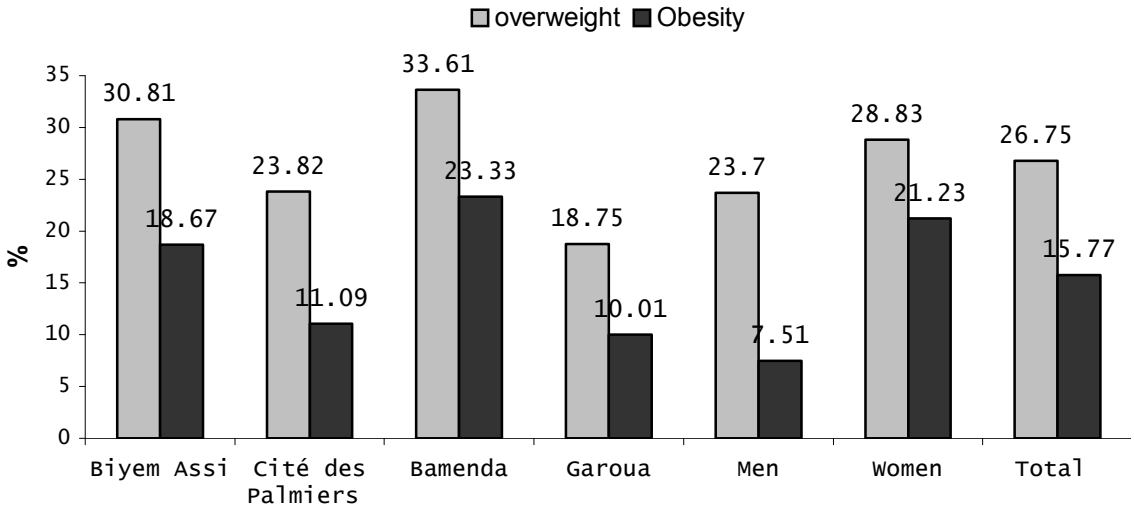
1. Overweight and obesity

The definitions of overweight and obesity were based on body mass index (BMI) ≥ 25kg/m^2 and 30 kg/m^2, respectively.

There was a gradual increase in the prevalence of obesity with age group, and, almost 60% of respondents aged 36 to 50 had a BMI above 25 kg/m^2 (table 6). Five percent and 25% of them were aware of their overweight and obese status respectively, and in each age group, women tended to be more obese than women. Putting overweight and obesity together (BMI ≥25kg/m^2), this gave a prevalence of 30% and 50% in men and women respectively after adjusting for age (fig. 7 and table 48).

Considering BMI≥ 30 kg/m^2, the prevalence of obesity was 7.51% in males and 21.25% in females respectively.

Figure 2: Prevalence of overweight and obesity



Age standardized using WHO new World Population

CamBod baseline Survey 2003

2. Blood pressure (Prevalence of hypertension)

The prevalence of hypertension was estimated at 24%. This prevalence varied remarkably according to sex and age group, and almost 50% of males or females above 55 years old had high blood pressure.

After adjusting for age, the prevalence of hypertension was found to be 26% in the male and 23% in the female populations (fig 1).

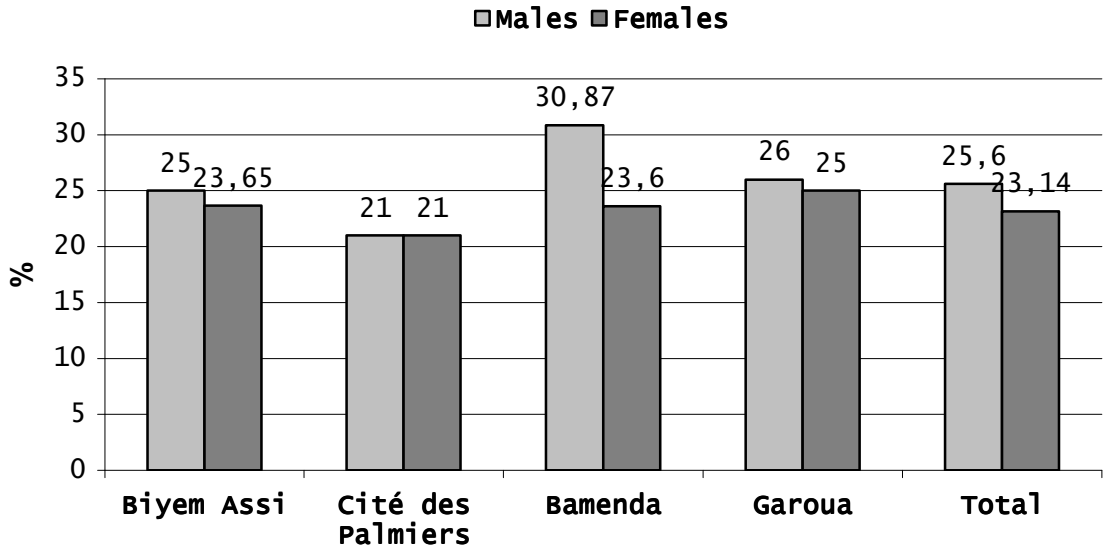
With respect to the different sentinel sites, the highest prevalence was found in Bamenda (26%) and the lowest in Cité des Palmiers (21%)

Table 6: Prevalence of Hypertension by site

	Prevalence [a]	Prevalence [b]	Prevalence [c]
Total	**14.80**	**24.20**	**18.32**
Biyem Assi	15.3	24.0	17.0
Cité des Palmiers	12.2	21.0	15.9
Bamenda	15.0	26.4	18.2
Garoua	16.8	25.4	22.2

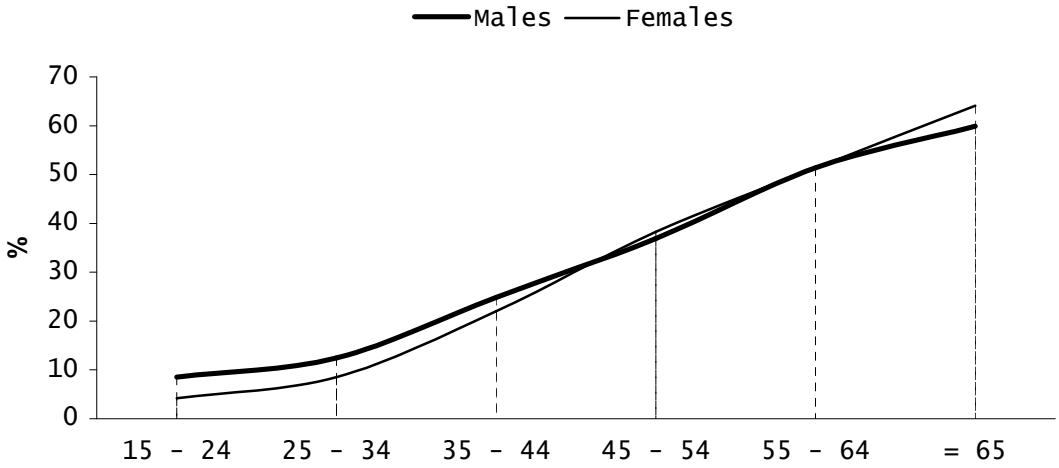
[a] estimated taking into account the stratified sampling procedure, [c] Age, sex and weight status adjusted, [B] Standardized using WHO New World Population

Figure 3: Prevalence of hypertension by site and sex



Percentages standardized using WHO New World Population CamBod Baseline Survey

Figure 4: Changes in hypertension prevalence with age



As shown in the figure above, there was a sharp increase in the prevalence of hypertension from the age groups 35 years and above indicating that, like the other CVDs, it is more preponderant within the older age groups.

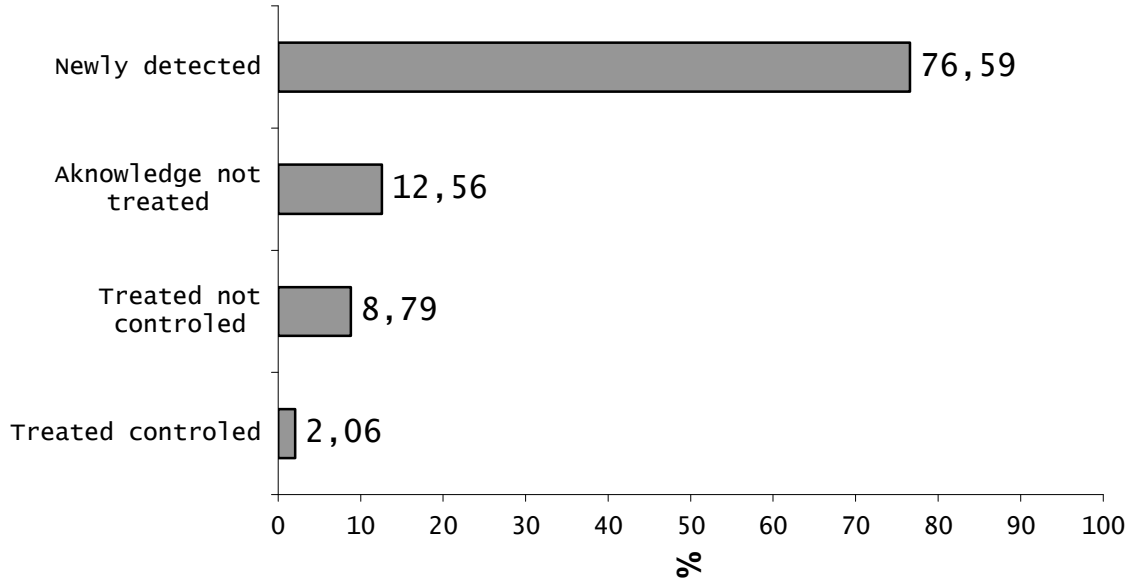
There was a remarkable association of hypertension and exposure to, or presence of the different risk factors. For example, it was realised that respondents who were overweight or obese tended to have a higher prevalence of hypertension. This was the same scenario with a positive family history of hypertension.

3. Detection and management of hypertension

Sixty six percent of all cases of hypertension went undetected and only 2% were controlled by medical treatment.

Of the 397 cases of known hypertension 46% were treated and 19% of the treated fully controlled.

Fig. 5: Awareness and management of hypertension by sites (all hypertensive)



Control defined as blood pressure < 140/90 mmHg, The denominator is the total number of hypertensives (New and known cases)

CamBod Baseline Survey

E. BIOCHEMICAL MEASUREMENTS (Step 3 OF STEPS)

1. Prevalence of diabetes and impaired glucose tolerance

The prevalence of diabetes was estimated at about 5.66% with a remarkable difference between sites. The highest prevalence was found in Cité des Palmiers (9.5%) and the lowest in Garoua (3.3%). There was no sex difference in the prevalence (5.78%, ci: 4.96-6.60 for males and 5.5%, ci: 4.80-6.20 for women). The upper age groups, 35 years and above had higher prevalences with the highest rate in the ≥65 years age group (9.1%, ci: 8.30-17.45).

Table 7: Prevalence of diabetes by site and by sex

	n	Number of cases	Prevalence [a]	Prevalence [b]	Age standardized [c]
Total	9377	489	4.79	5.37	6.06
Biyem Assi	2100	100	4.35	4.64	5.53
Cité des Palmiers	2332	219	9.14	9.52	9.71
Bamenda	2497	102	3.40	4.11	5.64
Garoua	2446	68	2.40	3.23	3.57
Men	3718	209	5.00	5.99	6.40
Women	5659	280	4.65	4.83	5.70

[a] Estimated taking into account the stratified sampling procedure
[b] adjusted for age and weight status (normal weight, overweight, obese)
[c] Age – standardized using the WHO New World Population

2. Detection and management of diabetes

Among the 489 detected cases of diabetes; 80% had no previous knowledge of their status. Seventy four percent of those who were aware of their diabetes status were on treatment and approximately 27% of the treated cases were controlled. Less than 5% of the respondents and almost 80% of the known diabetics had their blood glucose checked at least once in the past 12 months. The mean duration of diabetes in known patients was 7 years (5.55 – 8.70 years).

Considering the population attributable risk (fraction) for hypertension and diabetes for a number of risk factors, it was shown that intervening and controlling overweight and obesity alone could reduce the prevalence of hypertension and diabetes by 24% and 15% respectively in men; and 29% and 13% respectively in women.

Table. 8 Age adjusted population attributable risk for hypertension and diabetes with some risk factors

	Hypertension		Diabetes	
Men	Crude	Age - adjusted	Crude	Age - adjusted
Overweight or obesity	33.21	24.80	21.88	15.20
Overweight	20.53	15.60	9.00	5.20
Obesity	12.65	9.50	15.00	12.20
Abdominal obesity	22.35	10.47	25.00	18.00
Physically inactive (During leisure time)	18.86	(ns)	17.95 (ns)	6.67 (ns)
Women				
Overweight or obesity	38.00	28.90	17.20	16.00
Overweight	12.00	10.00	14.31	3.00
Obesity	26.00	19.75	14.31	13.50
Abdominal obesity	51.60	24.00	27.00	19.00
Physically inactive	14.30 (ns)	9.08 (ns)	ns	ns

HEALTH FACILITY DATA

1. Health facilities included and their status per sentinel site

As would be realized from the table below, data was collected from a total of 62 health facilities in the four sentinel sites. This figure gives the denominator on which most of the indicators were determined.

Table 9: Distribution of health facilities by categories in the four sentinel sites

Health Facility Category**	Biyem Assi		Cites des Palmiere		Bamenda		Garoua		TOTAL	
	Pri.	Pub.	Pri.	Pub.	Pri.	Pub.	Pri.	Pub.	Pri.	Pub.
Primary	8	4	6	2	8	8	12	9	**34**	**24**
Secondary	0	0	0	0	0	2	1	1	**1**	**3**
Tertiary	0	0	0	1	0	0	0	0	**0**	**0**
Total	**8**	**4**	**6**	**3**	**8**	**10**	**13**	**10**	**35**	**27**
TOTAL	**12**		**9**		**18**		**23**		**62**	

Pri. Private; Pub. Public

**Primary: Integrated health centers, Nursing homes, small private clinics, DHs

Secondary: Provincial hospitals, General private hospitals

Tertiary: University teaching hospitals, Reference Hospitals

2. Personnel in the four sentinel sites

Twelve specialist Internists (Diabetologists or endocrinologist, cardiologists, etc) were found in the four sites, a majority of them (11) based in the Cite des Palmiers site.

3. Number of health facilities with diabetic Clinics per site:

Of the sixty-two health facilities visited in the 4 sentinel sites, only 5 (8%) had organized diabetic clinics where activities like health promotion (IEC), screening and treatment normally took place. Three of the five clinics were based in the Biyem Assi health district.

4. **Basic clinical and Para-clinical Exams performed routinely in the health facilities.**

A majority of the health facilities took weight and BP routinely during consultations (90.3 % and 91.9% respectively). On the other hand, only 8% of the facilities do perform feet examination on a routine bases during consultations.

5. **Anti diabetic and anti hypertensive drug availability in health facilities**

Even though all the health facilities had pharmacists, just a little over a third (37%) of them had at least one anti diabetic drugs and a little over half (50%) had at least one anti hypertensive drugs.

6. **Existence of treatment guidelines and algorithms in the health facilities**

Just 4 (6.5%) of the 62 health facilities had existing treatment guidelines for diabetes. These guidelines were found only in the areas where there had been previous exposure from other projects (Bamenda and Biyem Assi.

7. **Elementary laboratory examinations in the health facilities**

In spite of the fact that only 5 of the 62 health facilities have running diabetic clinics, a little more than half (59.6%) perform fasting blood glucose and over 85.4% of them perform glycourea. However, only one health facility (1.6%) goes ahead to do OGTT.

8. **Equipment situation in the health facilities:**

A majority of the facilities had weighing scales and BP machines (93.5% and 83.8% respectively). A little above half had stadiometers (58%) and only 3.2% had BMI charts.

9. **Hospital morbidity and mortality data**

Of the 167 253 outpatient consultations registered in the four sentinel sites during a period of 12 months, there were 2 228 (1.33%) diabetes, 3659 (2.19%) hypertension, 269 (0.16) stroke and 42 (0.03) diabetic foot cases.

Of the 18 322 cases of hospitalizations in the four sites during a period of 12 months, there were 300 (1.64%) diabetes, 529 (2.89%) hypertension, 130 (0.71) stroke and 14 (0.08) diabetic foot cases.

Of a total of 746 hospital deaths in the four sites during a period of 12 months, there were 50 (6.7%) diabetes, 39 (5.2%) hypertension, 12 (1.6%) stroke, 5 (0.67) diabetic foot and 24 (3.21%) congestive heart failure cases.

Conclusion

The findings of the CamBoD baseline survey bring out the high prevalence of diabetes, hypertension and their related risk factors in the urban adult population of Cameroon. The prevalence of diabetes in the adult population averaged 6% and that of hypertension 25%. Obesity is almost reaching endemic promotion with almost 21 and 15 % of adults' females and males respectively being obese. The awareness of the population is very low (77% of hypertensives and 80% of diabetics are not aware of their condition) and the management of those conditions by health care providers is not adequate. This high prevalence of the risk factors, associated with aging of the population will result in the very near future, if nothing is done, to an increase in the number of patients, adding a heavy burden to an already overloaded health system.

These findings reveal the need of implementing health promotion activities on diabetes, hypertension and their related risk factors at the community level and the need to train health care providers in the management of those conditions

It therefore appears urgent for policy makers to implement evidence base policies, involving all the stakeholders, in order to prevent and to reverse the burden of diabetes and hypertension in the community and the country.

QUALITATIVE RESULTS

The qualitative component had two major prongs: the health facility level (health providers) and the community level (patients, community opinion leaders, and Traditional Healthcare Providers, THPs).

A. HEALTH FACILITY LEVEL

Health providers

Among the 62 healthcare facilities under consideration, 12 were specialist-led, 9 were GP-led and 41 were headed by nurses.

Just about 5 (8%) had organised diabetic clinics and 58 (93%) facilities referred patients with diabetes and especially diabetic complications to other health units.

Table 10. Reported provision of health education and education materials by the different health facilities

Activity/materials	Diabetes	HBP
Health education	46%	46%
Algorithms	9%	8%
Handouts	13.3%	14.5%
Posters	5%	5%
Demonstration aids	31.5%	28%
BMI charts	3%	3%

Weight and BP were routinely measured, while height was measured less frequently. The use of basic equipment such as weighing scales, BPMDs and stadiometers was not a routine for some health providers during consultations. When used, most providers did that in order to calculate drug dosages and not to identify risk factors. Most providers said they were using personal/own BP machines.

No facility routinely tested for blood sugar level although glucometers were available in 30 (48.4%) health facilities.

Health facilities that were in possession of existing diabetes and hypertension guidelines were mostly facilities that had benefited from previous HoPiT projects and activities.

70% of all the health providers felt they needed more training on the management of diabetes and hypertension.

The management and follow-up of diabetes and hypertension patients was essentially clinic-based since no home visits were done even for housebound patients.

Few services had access to dieticians and podiatry.

Due to heavy workloads provider had little time left for them to give appropriate counselling and follow-up to diabetes patients or those at high risk for diabetes and hypertension.

Overall, health services were handicapped by the acute lack of some basic equipment and massive workloads for providers, which led to less satisfactory patient-provider encounters. In addition, most providers (70%) felt that they needed better working conditions, more equipment and more incentives for them to optimise their inputs.

B. COMMUNITY LEVEL

1. Patients

- Patients complained of many worries. They worried about:
    - Neglect by the government as most of them felt the government was failing to subsidize their drugs as it does with HIV/AIDS drugs,
    - The lack of money to buy drugs
    - The lack of anti-diabetic and anti-hypertensive drugs in health facilities
    - Their degenerating health conditions
    - The lack of clinics to cater for their health needs. This was particularly true in Garoua where no NCD clinic existed.
    - Finally, patients worried about their lack of vital information and literature relating to their condition.
- Patients on insulin regretted not just the unavailability of insulin in the health districts but also the difficulties linked to the preservation and application of

the drug. Refrigerators for storage were not always available at homes for insulin storage and to make matters worse, frequent electricity failures was making many patients to lose their stocks of insulin.

- Most patients appeared poorly informed about the risk factors of diabetes and had little knowledge of complications. However, overall, patients were more knowledgeable than non-patients about diabetes and its risk factors.
- Although most of the patients were literate, few of them had received literature about their condition. The bigger majority had however, received counselling either as individuals or as a group during health education sessions in health facilities.

2. Community key informants' beliefs

Diabetes

- Across the sites, diabetes was referred to in local languages as "the sugar disease" and people with diabetes as "those suffering from too much sugar in the blood".
- Community people believed that diabetes is caused by consuming a lot of sugar and so can be prevented by avoiding sugar and sugar products such as sweets and sweet drinks.
- Some believed that diabetes could be acquired through genetic inheritance or through mother-to- child transmission and therefore cannot be prevented.
- Some informants believed that high blood sugar could be neutralised by drinking very bitter liquid substances such as Aloe Vera, Guinness, bitter leaves, etc.
- Some believed that diabetes can also be transmitted sexually, while some said by mosquito bites.
- Very few informants understood that sugar could be obtained from non-sweetening foods and drinks.

Obesity

- A good number of informants believed that obesity is natural and therefore cannot be controlled
- Informants also believed that being obese was a sign of wealth, good living and gave one a personality, e.g. the expressions:

"ventre administrative",
"ventre de commandement",
"tycoon"

were used as positive attributes to confer dignity, wealth and good living

- However, informants also believed that excessive weight (something like 3rd degree obesity) was undesirable and that most obese people want to lose weight not necessarily because of perceived health benefits but more because of corporal beauty and the desire to have a smarter outlook. Women were particularly quoted for this behaviour.

Physical inactivity

- Nearly all informants believed that although stressful, physical exercise was good for the body, e.g. "physical exercise enables the body to release (sweat out) its bad liquids", "without physical activity, bad liquids will remain in the body, potentially harming it". Hence, physical exercise was seen as a way of cleansing and restoring balance in the body.
- However, lack of time, ignorance, poverty and the lack of infrastructure were considered as factors that impede community people from massively engaging in physical and sporting activities.

Excessive alcohol consumption

- Excessive consumption of alcohol and drunkenness were universally condemned by informants who also believed that the law in Cameroon was too permissive on the sale and consumption of alcoholic products.
- All informants believed that the rate of consumption of alcohol in their respective communities was excessive and this was due to several reasons, namely: frustration, unemployment, idleness, and a strong historical culture of drinking.
- However, informants believed that moderate alcohol consumption was therapeutic to stress.

Smoking

- Smoking was the main form in which tobacco products were consumed. However, chewing and snuffing of tobacco were also commonly reported.
- The consumption of tobacco was universally condemned by informants.

- Reasons and excuses for taking tobacco were reported to be among the following:
    - To stimulate the body especially when places are cold
    - During moments of deep reflection
    - During moments of stress
    - When youngsters want to manifest their pride and independence
    - To fulfil an addictive urge (for addicts)
- Informants saw no connection between taking tobacco products and diabetes. However, the vast majority thought that tobacco products could cause damage to the lungs and thus, precipitate an onset of lung cancer.

Nutrition

- Most informants believed that fruits and vegetables were vital components of the daily diet even if these elements were not always taken.
- Fruits were eaten mostly seasonally when they are available in sufficient quantities and their prices affordable. However, rich people were seen as people capable of buying fruits and vegetables the year round since they have the wherewithal.
- Informants further observed that most poor people can afford to eat just what they themselves can produce/cultivate and therefore do not have the opportunity to translate their beliefs into beneficial behaviours.
- Obstacles to the daily consumption of fruits and vegetables were cited as:
    - Seasonal scarcity of the commodities
    - High or prohibitive cost of fruits and vegetables especially in the dry season
    - The lack of financial means
    - Ignorance or the lack of education about nutrition
    - Low perception of the health import of fruits and vegetables

3. Traditional healthcare providers (THPs)

- Many of the THPs believed that there are two origins of diabetes: natural and mystical origins. Diabetes resulting from natural origins is treatable mainly in modern health facilities, but when mystical causes are suspected, these

conditions must be treated first by the THPs and then, referred to the modern health facilities.

- Most if not all, believed that diabetes can be cured effectively and some even claimed to have already cured several cases.
- Most of the THPs were aware that diabetes quite often leads to complications but were uncertain about these complications. At best they had incoherent and distorted knowledge of diabetes, its risk factors and its complications.
- Knowledge of the dietary requirements of diabetic patients was extremely limited although sometimes correct. For example, diabetic patients should avoid eating a lot of sugar, was a consistent recommendation from the THPs.
- Diagnosis was strictly symptomatic and speculative and confirmation in most cases was done in the modern health facilities or laboratories.
- The use of BPMDs, glucometers, weighing scales and other modern equipment was unknown to THPs.
- THPs saw their role not as competitive but complementary to modern therapy in the diabetes management chain.
- THPs believed that indigenous medicine was being unjustly neglected and that the emergence of diseases such as diabetes, hypertension, AIDS provided new opportunities for cooperation and justification for why they should not be left out.
- Treatment was mainly by scarification, incision and piercing with the use of blades or other sharp metal devices and this was done irrespective of whether or not a patient ran the risk of developing a diabetic foot or other complications.

C. RECOMMENDATIONS

Healthcare providers

1. Healthcare providers need more training on NCD risk factor assessment, counselling and the management of diabetes.
2. NCD risk factor assessment and subsequent counselling should be made routine during all consultations.
3. Healthcare providers need to be supplied with diabetes management algorithms, and education materials for patients and people at risk.
4. Since there is a general problem of staffing within the health system in Cameroon and doctors are very few relative to the workload, the strategy

would be to train intermediate staff (nurses) both at primary and tertiary health units who will be more stable and available to care for patients. This will help improve on the benefits of patient-provider encounters.

5. It is worthwhile setting up a sustainable surveillance system for diabetes comparable to the one for infectious diseases as the CAMBoD project wants to do. Such a system will help reveal the evidence necessary for the MOH to develop and implement realistic programmes for NCD service planning, improvement and development and make NCDs a clinical priority within the Cameroon health system.

Diabetic patients

1. Diabetic patients face lots of difficulties in seeking appropriate healthcare for their ill-health conditions. It is recommended that future intervention strategies should target essentially these difficulties. Through CAMBoD advocacy efforts, a convention has just been signed between Lifescan Inc., (a Johnson & Johnson Company), and the Ministry of Public Health, Cameroon. This will ensure, in the nearest future, that basic blood glucose testing and measuring equipment are available to patients at a reduced cost. Other interventions that target especially the supply of subsidized drugs are badly needed.
2. Since domestic management of diabetes depends very much on family support, health education and counselling for diabetic patients should do everything possible to involve family members.
3. Future control programmes will need to adopt strategies that seek to reduce the delay in seeking appropriate care for diabetes because of misinterpretation of symptoms, poor knowledge of risk factors, lack of diabetes clinics, the inability to pay for cost of services and treatment, and the lack of information about control measures.

Community people

1. Identifying the risk factors for diabetes was clearly out of the competence of ordinary people suggesting that a community approach whose objective will be to educate and clarify the population about diabetes and its associated risk factors is of vital importance at this stage.
2. The ideal place for seeking healthcare for diabetes is a health facility. However, people often delay seeking healthcare in a health facility because of financial constraints, lack of diabetic clinics, and a deep-seated culture of

auto-medication. Interventions will need to target these aspects and strategize on the basis of how to overcome barriers bordering on these factors.

3. Programmes will have to lay emphasis on the awareness of risk factors, the recognition of early signs and symptoms of diabetes and what to do to correct the situation before it becomes irreversible and permanent.
4. Although people are aware of the importance of regular physical exercise, they still have a low perception of its beneficial effects and are impeded to doing physical exercise by structural as well as individual factors. Future programmes will need to raise people's perceptions of the potential benefits of regular exercises and advocate for the development of an environment conducive for mass participation in physical exercises.

Traditional Healthcare Providers

1. THPs are very influential people in the various communities studied. They would need training if they have to participate meaningfully to the prevention, control and surveillance of diabetes. A sustainable standard approach should be built into an intervention package incorporating positive aspects of diabetes management by THPs while trying to improve on their knowledge about the outcome of negative practices, e.g. scarification for diabetics.
2. Since THPs are very persuasive persons, their involvement can help to reduce the prevalent myths and misconceptions about diabetes noticed during this baseline. In a number of cases, THPs were at the origin of myths and misconceptions. Involving THPs will entail educating them on how to evaluate and recognise risk factors, signs and symptoms of diabetes, give people the right education, and make proper and timely referrals to the health facilities.
3. THPs will also need to know that diabetes is not curable, as claimed by most of them, but can be properly controlled, and also that diabetic patients need lifelong care at various levels to avoid the onset of complications and an early precipitation of death.

Conclusions

Data reveal that treatment seeking behavior for diabetes is largely the outcome of the interplay between the diabetic patient, the entire family (immediate and extended), friends and healthcare providers (THPs and modern healthcare providers). Meaning that just every community member may be influential in

determining when a diabetic patient seeks the right treatment for diabetes. In addition, diabetic patients face lots of difficulties in seeking appropriate care for their ill-health conditions. These difficulties include, but are not limited to, lack of finance, education, drugs, and equipment and the absence of diabetes clinics. Interventions will have to target these aspects, either wholly or partially, if the prevention and control agenda for diabetes has to move forward in Cameroon.