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An Analysis of Impaired Fasting Glucose and Diabetes Risk Factors in Yaoundé, Cameroon in 2007 for adults aged 25 years and above

A RESEARCH REPORT SUBMITTED TO THE FACULTY OF HEALTH SCIENCES, UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN MEDICINE IN THE FIELD OF EPIDEMIOLOGY AND BIOSTATISTICS BY COURSEWORK AND RESEARCH REPORT

JOHANNESBURG, MARCH 2011

SUBMITTED BY

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DECLARATION

I, Nyuyki Clement KUFE, declare that this research report is my own work. It is submitted in fulfilment of the requirements for the degree of Master of Science in Medicine (MSc-Med) in the Field of Epidemiology and Biostatistics at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.



.....

Signature of candidate

This 25th day of **March 2011**

DEDICATION

TO

The evergreen memory of my grandparents, KUFE Zackaria (RIP 04/01/2002) and Clara SHAMLA (RIP 12/08/2006). All your works has been rewarded many fold and your prayers answered by the Almighty God. Thank you.

My wife, Wanyu Elfrida B, for her support throughout this period when I have been away. My children, Kufe Zack N, Kufe Diane Y, Kufe Wally K, Kufe Jesse-Neree L, their nanny Odette and my sister Linda for being understanding and enduring my absence through the period of study.

My parents, sisters, brothers, uncles, aunts, cousins and friends.

ABSTRACT

BACKGROUND

The prevalence of diabetes is increasing worldwide. It is projected to rise to 438 million by 2030 from 285 million in 2010. The burden of diabetes is greatest in low and middle income countries, in those of lower socio economic status, the disadvantaged and minorities bearing most of the burden. Africa faces a dual burden of communicable diseases like malaria, HIV/AIDS and tuberculosis and non–communicable chronic diseases like diabetes and hypertension. Treatment and control is unavailable and inaccessible to most people due to inadequate resources. Information of risk factors at local and regional level is of utmost importance for tailored prevention programmes to curb the rise in diabetes.

OBJECTIVES

A population-based survey was conducted in Biyem, Assi, Yaoundé – Cameroon in 2003 to evaluate the burden of diabetes and hypertension in urban adults aged 25 years and older. Subsequently an intervention was rolled out, followed by another population-based survey in 2007. The current study was undertaken to investigate risk factors for impaired fasting glucose (IFG)/diabetes following a population-based diabetes prevention programme in Biyem Assi, Cameroon.

METHODS

Secondary data analysis of a cross–sectional study of 1712 participants of the Cameroon Burden of Diabetes (CAMBoD) Project in Yaoundé 2007 collecting detailed information on cardiovascular risk factors by use of the WHO STEPS approach was conducted. IFG/diabetes was defined as FCG≥6.1 mmol/l and / or being on diabetes medication.

Descriptive statistics and multivariate logistic regression analyses were used to describe prevalence of IFG/diabetes, prevalence of risk factors for IFG/diabetes and to investigate the association of the risk factors with prevalence of IFG/diabetes.

RESULTS

Prevalence of IFG/diabetes was 7.7%, (men 8.5% and women 7.1%) in the population older than 25 years of age in Biyem Assi, Yaoundé, Cameroon in 2007. Age (OR=2.92, 95% CI: 1.62–5.26, p<0.0001, for 35– 44years, OR=4.33, 95% CI: 2.56–7.32, p<0.0001 for 45–54 years and OR=9.08, 95% CI: 5.30–15.57, p<0.0001 for 55–64 years), overweight (OR=1.57, 95% CI:0.99–2.49, p=0.053), obesity (OR=2.18, 95% CI:1.38–3.43, p=0.001), high sugar consumption (OR=2.95, 95% CI:1.73–5.04, p<0.0001), elevated waist-to-hip ratio (OR=2.82, 95% CI:1.96–4.05, p<0.0001), elevated waist circumference (OR=2.27, 95% CI:1.52–3.37, p<0.0001), and hypertension (OR=2.02, 95% CI:1.40–2.91, p<0.0001) were associated with diabetes. Being single was inversely associated with diabetes (OR=0.30, 95% CI: 0.18–0.49, p<0.0001). Vigorous activity was significantly associated with diabetes (OR=2.83, 95% CI:1.20–6.66, p=0.017). For hypertension, obesity and being single the association was attenuated after multivariate adjustment, whereas age, markers of central obesity and high sugar intake remained to be significantly associated with diabetes.

CONCLUSION AND RECOMMENDATIONS

This study shows a high prevalence of IFG/diabetes in 2007 in Biyem Assi, Yaoundé Cameroon after a population-based diabetes and hypertension intervention programme took place. IFG/diabetes was significantly associated with age, markers of central obesity and high sugar intake. Further preventive efforts should specifically be aimed at reduction of these modifiable risk factors for diabetes in urban populations in Cameroon.

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ACRONYMS

ADA: American Diabetes Association

AIDS: Acquired Immune Deficiency Syndrome

BMI: Body Mass Index

CAMBoD: Cameroon Burden of Diabetes

CDC: Centers for Disease Control and Prevention

CI: 95% Confidence Interval

CVD: Cardio Vascular Disease

DALY: Disability Adjusted Life Years

DBP: Diastolic Blood Pressure

FCG: Fasting Capillary Glucose

FFA: Free Fatty Acid

FMBS: Faculty of Science and Biomedical Sciences

GI: Glyceamic index

HDL: High Density Lipoprotein

HIV: Human Immunodeficiency Virus

HoPiT: Health of Populations in Transition Research Group

IDF: International Diabetes Federation

IEC: Information, Education and Communication

IFG: Impaired Fasting Glucose

IGT: Impaired Glucose Tolerance

KPAB: Knowledge, Practices, Attitudes and Beliefs

MOH: Ministry of Health

NAFLD: Non Alcoholic Fatty Liver Disease

NCD: Non-Communicable Diseases

NIDDM: Non Insulin Dependent Diabetes Mellitus

OGTT: Oral Glucose Tolerance Test

OR: Odds Ratio

SBP: Systolic Blood Pressure

sdLDL: small dense Low-Density Lipoprotein

TNF-α: Tumor Necrosis Factor α (Pro-inflammatory cytokine)

UNPF: United Nations Population Fund

USA: United States of America

WC: Waist Circumference

WDF: World Diabetes Foundation

WHO: World Health Organization

WHR: Waist to Hip Ratio

CHAPTER ONE

INTRODUCTION

This chapter presents the global picture of non–communicable chronic diseases (NCDs) in the world, Africa and Cameroon. It high-lights the burden of diabetes as an important NCD and the burden of diabetes by reviewing existing literature.

1.1 BACKGROUND OF THE STUDY

Despite advances in technology, the quality of care in medicine and improvements in health care delivery systems, there is an increase in the prevalence of NCDs like diabetes in both developed and developing countries. This can be attributed to an increase in the prevalence of risk factors of diabetes. According to World Health Organization (WHO) experts, 246 million people (6%) aged 20 to 79 were living with diabetes worldwide in 2007 [1]. 285 million people (6.6%) were living with diabetes in 2010 and the number is expected to increase to 438 million people (7.8%) 2030 [2]. In Cameroon, a country of about 18.5 million inhabitants in Central Africa [3] the prevalence of diabetes in 2003 was 0.8%, 4.1% in 2007 and it is estimated to be 4.5% by 2025 [2].

Each year 3.8 million deaths worldwide are directly linked to diabetes. Type 2 diabetes (diabetes mellitus) is the most common type of diabetes and accounts for around 90% of all diabetes cases worldwide. The burden of diabetes is particularly high in low and middle income countries and disproportionately affects lower socio economic groups and the disadvantaged [1, 2]. Recent investigations based on the STEP-wise approach for monitoring risk factors of NCDs and a meta-analysis showed that the prevalence of diabetes mellitus in Africa is between 1% and 20% [4, 5].

Africa faces a dual burden of communicable diseases like malaria, HIV/AIDS and tuberculosis and NCDs like hypertension and diabetes. With limited resources and multiple needs very few people get adequate treatment and control for these diseases is poor. This scenario inevitably leads to an increase in morbidity and mortality from potentially preventable NCDs and their complications [6–9].

Cameroon like many other developing countries has entered an epidemiological transition with a net increase in the risk factors of NCDs and increased prevalence of NCDs [10–14].

The factors that affect the onset of type 2 diabetes are well known. They include non-modifiable factors like older age (over 45 years of age) and ethnicity and modifiable risk factors like obesity, physical inactivity, tobacco consumption and excessive alcohol consumption [2]. In 2003, a population-based survey was conducted in Yaoundé–Cameroon to evaluate the burden of diabetes and hypertension, as well as the risk factors in diabetes [15, 16].

1.2 STATEMENT OF THE PROBLEM

Diabetes is fast becoming a worldwide epidemic. It is a burden to health and economic systems all over the world particularly in low or middle income countries with devastating human, social and economic consequences for the patients and their community. Diabetes is responsible for major contemporary causes of morbidity and mortality. Major diabetic complications include cardiovascular disease (CVD), retinopathy, nephropathy, neuropathy and amputation. Fifty percent of people living with diabetes die of cardiovascular disease [2].

Diabetes is one of the world's most important causes of expenditure, mortality, disability and lost economic growth. In 2007 about 3.8 million people in the 20-79 age group the world over were estimated to have died from diabetes related causes. This is greater than 6% of total world mortality.

More than two-thirds of the deaths occur in developing countries. Eighty percent of persons with diabetes will soon live in low- and middle-income countries. Currently more than 80% of expenditures for medical care for diabetes are made in the world's economically richest countries, not in the low- and middle-income countries where more than 70% of people living with diabetes live and where not enough is spent to provide even the least expensive anti-diabetes drugs [2].

Type 2 diabetes can be controlled and may be prevented via lifestyle modification. A change in lifestyle prevents or delays onset of diabetes. Studies have shown the unequivocal increase in type 2 diabetes and increasing prevalence of risk factors of diabetes. This is an important public health problem.

1.3 JUSTIFICATION FOR STUDY

Though a majority of people understand the multiple health benefits of a consistent, constant and concerted change in individual habits, which can positively influence modifiable risk factors of diabetes very few people attempt to practice them. Sufficient evidence demonstrate that weight loss, diet and exercise can prevent or delay type 2 diabetes [17–20]. Physical activity may exert an independent effect on the prevention and control of diabetes [21]. Less than 60% of the world population carry out the recommended minimum 30 minutes moderate-intensive aerobic (endurance) physical activity on five days a week or vigorous-intensive aerobic physical activity for a minimum of 20 minutes on three days a week for all healthy adults aged 18 to 65 years [22–23]. Prevention and control of non-communicable risk factors can lead to the prevention of potential epidemics of non-communicable diseases in the future, and therefore should become the focus for health authorities, especially in developing countries.

Prevention costs governments' and individuals far less than treating diabetes and its complications. This study will assess how risk factors of diabetes like age, obesity, physical inactivity, fruit and

vegetable consumption, high added sugar intake, tobacco and alcohol use are associated with diabetes in the urban population in Yaoundé, Cameroon after implementation of a population-based diabetes prevention programme.

1.4 LITERATURE REVIEW

Many studies have been carried out to show the unequivocal increase in type 2 diabetes [14–16, 24]. Risk factors of type 2 diabetes are obesity, poor diet, sedentary lifestyle, increased age (21% of people over 60 years of age have diabetes), family history, ethnicity, history of metabolic syndrome and history of gestational diabetes [14, 16, 17, 25, 26].

Obesity and central obesity

The amount of fat in human body responsible for obesity can be measured directly or indirectly. There are many methods of directly measuring the amount of fat in the human body. However, these methods usually involve complicated procedures carried out in specialist laboratories. Indirect methods are based on the relation between height and weight. The most common and accepted in adults are body mass index and waist circumference.

Body Mass Index[1] (BMI) is an index derived from height and weight. It is a simple index of weight-for-height commonly used to classify underweight, overweight and obesity in adults. BMI is a fairly reliable indicator of healthy body weight for most people. BMI does not measure body fat directly but BMI correlates to direct measures of body fat [27, 28]. The correlation between BMI and body fatness is fairly strong; however the correlation varies by sex, race, and age [29, 30]. BMI is an inexpensive and easy-to-perform method of screening for weight categories that may lead to health problems but it is not a diagnostic tool. An obese person has accumulated so much body fat that it

[1] BMI formula: weight (kg) / [height (m)]^2

might have a negative effect on their health. A BMI between 25 and 29.9 is considered overweight, BMI equal or above 30 is considered to be obese [31, 32].

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 and Above	Obese

The presence of excess fat in the abdomen can be assessed by waist-to-hip ratio and waist circumference [31, 32]. Men and women with a waist to hip ratio greater than 0.9 and 0.85 [33] respectively are at increased risk of being centrally obese. Sex specific cut offs for waist circumferences [32-35] are as follows:

Waist circumference	Men	Women
Normal	<94 cm	<80 cm
Increased risk	≥94 cm	≥80 cm
Greatly increased risk	≥102 cm	≥88 cm

Type 2 diabetes is caused by resistance to insulin action. High levels of blood glucose from food and beverage consumption stimulate beta cells found in the Langerhans Islets of the pancreas to release insulin into the blood. Insulin subsequently stimulates insulin-sensitive tissues in the muscle, adipose tissues, etc to absorb glucose. This lowers blood glucose levels. As the blood glucose level falls, beta cells reduce insulin production. Blood glucose then settles to a constant value. Insulin resistance sets in when normal levels of insulin do not control blood glucose levels and as such insulin levels remain higher and blood glucose levels are still maintained during the compensated phase. In insulin resistant persons compensatory insulin secretion fails and fasting (impaired fasting glucose) or postprandial (impaired glucose tolerance) glucose concentrations increase. Type 2 diabetes occurs when average glucose levels are consistently elevated as the resistance increases and compensatory insulin secretion fails. Elevated insulin levels have additional effects causing further abnormal biological effects.

Insulin resistance is associated with overweight and obesity in a condition known as metabolic syndrome. Insulin resistance is often found in people with a high degree of fatty tissue within the abdomen known as visceral adiposity (as distinguished from subcutaneous adiposity or fat between the skin and the muscle wall, especially elsewhere on the body such as hips or thighs), hypertension, hyperglycemia and dyslipidemia (elevated triglycerides), small dense low-density lipoprotein (sdLDL) particles, and decreased HDL cholesterol levels. Visceral cells adipose unlike subcutaneous adipose tissue produce significant amounts of pro-inflammatory cytokines such as tumor necrosis factor-alpha (TNF-a), and Interleukins-1 and -6, etc and visceral adiposity is related to an accumulation of fat in the liver, a condition known as nonalcoholic fatty liver disease (NAFLD). NAFLD leads to an excessive release of free fatty acids into the bloodstream (due to increased lipolysis), and an increase in hepatic glucose production. Both of which exacerbates peripheral insulin resistance and increasing the likelihood of Type 2 diabetes mellitus. Ectopic fat may also be responsible for insulin resistance.

Adipose tissue secretes a number of hormones and bioactive substances known as adipocytokines (adipokines). Well known adipokines include leptin, adiponectin, tumour necrosis factor alpha (TNFα) and IL-6. Several other adipokines, including visfatin, plasminogen activator inhibitor-1, angiotensin, resistin and glucocorticoids, have been identified [36]. Adiponectin is considered to be a marker of insulin sensitivity and plasma concentrations of adiponectin correlate negatively with insulin resistance. Administration of adiponectin has been shown to improve insulin sensitivity via a decrease in hepatic glucose output and increased fatty acid oxidation in muscle in mice [37-47].

Obesity is associated with increased health-care costs, reduced quality of life, and increased risk for premature death. Common morbidities associated with obesity include coronary heart disease, hypertension and stroke, type 2 diabetes, and certain types of cancer [48,49]. A number of studies have documented increased mortality from obesity [50-53]. Obesity is the number one risk factor for

diabetes. Greater weight implies a higher risk of insulin resistance. Adipose tissue releases increased amounts of non-esterified fatty acids, glycerol, hormones such as leptin, pro-inflammatory cytokines such as TNF-α that allows the adipose organ to play a major regulatory role in energy balance and glucose homeostasis that are involved in the development of insulin resistance with wide reaching effects on other organs including the brain. This relationship is very complex and underscores the fact that adipose tissue undoubtedly sub serves multiple functions [54].

Sedentary activity

Sedentary lifestyle and overweight go hand in hand towards susceptibility to type 2 diabetes. Insulin resistance can be decreased by exercising. Physical activity improves insulin sensitivity, thus improving glycaemic control, and may help with weight reduction. Muscle cells have more insulin receptors than fat cells. Exercising lowers blood sugar levels by helping insulin to be more effective [55]. Regular physical activity has been associated with enhanced health and reduced risk of all-cause mortality [56–58]. The Surgeon Generals' report on Physical Activity and Health [59] states that "a sedentary lifestyle is damaging to health and bears responsibility for the growing obesity problems" Various approaches have been adopted to study physical activity. A physical activity questionnaire has been validated for sub Saharan Africa [60] and there exist a global physical activity questionnaire recommended by WHO for studies.

Diet

Poor diet is largely responsible for obesity. Unhealthy eating-patterns like too much fat, insufficient fibre, lack of fruits and vegetables and too many simple carbohydrates all contribute to the development of obesity and are contributory causes of diabetes. Healthy eating habits can in part reverse or prevent people from developing type 2 diabetes. Meals rich in fruits, vegetables, with less fat and complex carbohydrates and fibre considerably reduce the risk of developing diabetes [61].

Family history of diabetes

People with a family history of type 2 diabetes are at a greater risk of developing it themselves and they have TCF7L2. A variant of the TCF7L2 (transcription factor 7-like 2) gene is associated with type 2 diabetes. People at increased risk would be motivated to avoid the lifestyle habits that lead to diabetes. [62-66]

Ethnicity

Type 2 diabetes is more common in African-American, Native American, Latino, Pacific Islander and Asian-American populations [67,68]. Indian populations that have migrated from India develop type 2 diabetes easily. However, having a genetic disposition towards type 2 diabetes does not necessarily result in diabetes. Studies by Eaton and Konner have illustrated that in most cases lifestyle is the primary determinant for development of type 2 diabetes [69,70].

Age

The risk of developing diabetes increases with age [71]. Even a thin elderly person may be predisposed to develop diabetes. It is known that with age beta cell output falls and whole body insulin resistance increases. This may be due to increased visceral fat accumulation.

Metabolic syndrome

Metabolic syndrome represents a combination of cardio-metabolic risk determinants including obesity, insulin resistance, glucose intolerance, dyslipidaemia, non-alcoholic fatty liver disease and hypertension [72-75]. Obesity, high fat diet and lack of exercise are some factors that may predispose to metabolic syndrome.

1.5 AIM OF STUDY

To determine the prevalence of risk factors of IFG/diabetes for men and women aged 25 years and above in an urban population of Yaoundé, Cameroon, in 2007.

1.6 OBJECTIVES

- Describe the prevalence of IFG/type 2 diabetes (FCG≥6.1 mmol/l) in adults aged 25 years and above in an urban population of Yaoundé in 2007.
- Determine the prevalence for risk factors of IFG/type 2 diabetes in adults aged 25 years and above in urban population of Yaoundé in 2007.
- Describe the association of IFG/type 2 diabetes and risk factors in the target population.

1.7 DEFINITION OF TERMS

Adiposity: the amount of body fat expressed as either the absolute fat mass (in kilograms) or as the percentage of total body mass.

Diabetes: a group of heterogeneous disorders with the common elements of hyperglycaemia and glucose intolerance, due to insulin deficiency, impaired effectiveness of insulin action, or both. Diabetes mellitus is classified on the basis of actiology and clinical presentation of the disorder into four types namely type 1 diabetes, type 2 diabetes, gestational diabetes mellitus (GDM), and other specific types [2].

Type 2 diabetes: characterized by insulin resistance and relative insulin deficiency, either of which may be present at the time that diabetes becomes clinically manifest [2].

Normal glycemia: Plasma glucose levels <6.1 mmol/l (<110mg/dl) in the fasting plasma glucose test and a 2-h postload value <7.8 mmol/l (<140 mg/dl) in the OGTT and abnormal glycemia when plasma glucose levels >6.1 mmol/l (>11o mg/dl) in the fasting plasma glucose test and a 2-h postload value > 7.8 mmol/l (>140 mg/dl) in the OGTT [66].

Diabetic participants: all respondents whose FCG≥7.0 mmol/l (126mg/dl) and / or on diabetes medication (insulin and / or on oral therapy).

Impaired Fasting Glucose: all respondents whose FCG is between 6.1 mmol/l to 6.9 mmol/l (110mg/dl to 125mg/dl) [83].

Impaired Glucose Tolerance: all respondents having FCG less than 7.0 mmol/l (126mg/dl) and 2-hour values of OGTT greater than or equal to 7.8 mmol/l (140 mg/dl) but less than 11.1 mmol/l (200mg/dl).

Demographic information: sex, age, marital status, province of origin, highest level of education, occupation.

Anthropometric measurements: measurement of weight, height, waist, arm and hip circumference.

Clinical measurements: measurements of systolic, diastolic blood pressure, fasting capillary glucose.

Prevention of diabetes: individual lifestyle attitude that can avoid or delay onset of diabetes such as exercise, losing weight, diet, stop smoking and moderate consumption of alcohol.

Insulin resistance: usually connotes resistance to the effects of insulin on glucose uptake, metabolism, or storage. Insulin resistance in obesity and type 2 diabetes is manifested by decreased insulin-stimulated glucose transport and metabolism in adipocytes and skeletal muscle and by impaired suppression of hepatic glucose output.

Current smokers: individuals who smoke at least a cigarette (manufactured cigarettes, hand rolled cigarettes, pipes or cigars) everyday.

Glycemic Index (GI): is a numerical system of measuring how fast carbohydrate triggers a rise in circulating blood sugar – the higher the number, the higher the blood sugar response.

Alcohol consumption: individuals who drink at least a bottle of beer (600ml), a glass of wine (30ml), a cup palm wine (30ml), a shot of whisky, a bowl (750ml) of "bil bil", "arki", "afofo" or corn beer of at least 5.0% ethanol content a day in the past 30days.

Fruits consumed: Consumption of one to seven times a week of fruits (one medium size piece of apple, banana or orange or ½ a cup of chopped, cooked or canned or fruit juice not artificially flavoured).

Vegetable consumed: Consumption of one to seven times a week of vegetables (one cup of raw green leafy vegetables – njama njama[2] and cowpeas[3], cabbage, spinach, salad, etc or ½ a cup of other vegetable cooked or chopped raw- Tomatoes, carrots, pumpkin, cabbage, green beans, onion, etc.

[2] Local vegetable and [3] local vegetable

Vigorous activity: Vigorous activity is defined as sustained activity that results in a significant increase in heart and breathing rate [76] such as work involving physical activity for at least ten minutes like heavy lifting, forestry (cutting, chopping, carrying wood), sawing hardwood, farm work like ploughing, cutting crops (sugar cane), gardening (digging), grinding (with pestle), construction work (shovelling sand), loading furniture (stoves, fridge), instructing sports aerobics, sorting postal parcels (fast pace), soccer, rugby, tennis, high-impact aerobics, aqua aerobics, ballet dancing, fast swimming.

Moderate intensity activity: Defined as an activity in breathing somewhat harder than normal for at least ten minutes such as cleaning (vacuuming, mopping, polishing, scrubbing, sweeping, ironing), washing (beating and brushing carpets, wringing clothes (by hand), milking cows (by hand), planting and harvesting crops, weaving, woodwork (chiselling, sawing softwood), labouring (pushing loaded wheelbarrow, operating jackhammer), carrying light load on head, drawing water, tending animals, brisk or quick walking.

Low intensity activity: Activities involving mostly sitting or standing with walking for not more than ten minutes or a person not meeting any of the above mentioned criteria falls into this category.

Fasting: no consumption of food or beverage other than water for at least eight hours.

Hypertension: participants with systolic blood pressure $\geq$140 and diastolic blood pressure $\geq$ 90 mmHg and/or on hypertensive medication.

CHAPTER TWO

INTRODUCTION

This chapter reviews the aims, objectives and methods of the Cameroon Burden of Diabetes (CAMBoD) project and describes the methodology of the secondary data analysis. The chapter also explains the process of data transfer, cleaning and analysis and describes the ethical issues involved in the study.

2.1 METHODOLOGY

2.1.1 Back ground of the Cameroon Burden of Diabetes (CAMBoD) Project

The CAMBoD project commenced in January 2003 in four ecological zones of Cameroon: Cité des Palmiers Health District in Bonamoussadi-Douala town, Littoral province (coastal zone), Garoua Urban Health District-Garoua town, North Province (Sahelian zone), Biyem Assi Health District-Yaoundé town, Centre province (Forest zone), Bamenda Urban Health District-Bamenda town, North West province (High plateau zone).

The goal was to build a multidisciplinary programme contributing to surveillance, prevention and control of diabetes that could serve as a model for other NCD programmes in Cameroon and other countries in the region.

Based on the baseline survey conducted in 2003, a surveillance, prevention and intervention programme of hypertension, diabetes and its risks factors was introduced. These activities have stimulated the Cameroon Government to put in place a National NCD Programme covering all regions of country [77][3].

[3] Project Report

From September to October 2007 a second population–based survey was conducted to evaluate the impact of the activities within the initial four pilot sites on the prevalence of hypertension and diabetes, and their risk factors.

2.1.2 Study design

This study is a secondary data analysis of the cross–sectional Cameroon Burden of Diabetes (CAMBoD) Project in Yaoundé 2007

2.1.3 Study population and area

The study population comprised 2 500 adults aged 25 years and above who were living in the Biyem Assi area–Yaoundé, Cameroon for at least one year. A census was carried out to obtain a list of participants living in this area and a map was drawn (Census form: Appendix A, Communiqué of the district officer of Yaoundé VI–Biyem Assi: Appendix B). All respondents of the 2003 CAMBoD study were automatically included in the study. Subsequently, by a cluster random sampling, a cluster being a household, additional participants were recruited based on a frame of 1058 households obtained after the census.

All available forms of mass media were used for sensitisation of the population (radio spots, information in churches, hospitals and local representatives: Appendix C) about the aim and the period of the survey.

2.1.4 Sample size

The WHO STEPwise approach for collecting surveillance data for non-communicable diseases was used to determine the sample size. According to this approach, at least 250 adults of both sexes for every 10-year age group interval were needed to obtain accurate prevalence [3].

Interviewers visited, on the first occasion, the chosen households between 9.00am and 4.00pm or at a convenient time for both the survey workers and the household members. The adult participants (25 years and above) were asked to fast from 9.00pm the night before the next appointment, having nothing to eat or drink but clear water. This appointment was between 5.30am and 9.00am for fasting capillary blood glucose measurement. If a household was visited after 9.00am for the interview, fasting capillary blood glucose was measured the next day.

2.1.5 Data collection

Data was collected by medical doctors and nurses were trained particularly for the survey using interviewer administered questionnaires, examination of participants and biochemical analysis. Teams of four interviewers were constituted, and they included a medical doctor. The questionnaire used was developed based on WHO's STEPwise approach to surveillance of chronic diseases' risk factors (STEPS) and adapted to local realities [3]. It involves three initial levels: 1) the use of interviewer administered questionnaire to assess participants' self reported behavioural and lifestyle factors for chronic diseases, 2) measurement of participants' blood pressure and anthropometrical parameters and 3) collection and biochemical analysis of participants' blood samples. The questionnaire served to collect socioeconomic and demographic data, data on past and current medical history of diabetes and its risk factors: tobacco smoking, alcohol consumption, nutrition, physical activity and obesity.

Anthropometric measurements included weight (to the nearest 0.1 kg) using SECA scales, height using a stadiometer (to the nearest 0.1 cm), waist and hip circumference using a flexible plastic meter band (to the nearest 0.1 cm). These measurements were performed by trained interviewers. Every subject included in the study was visited between 5:30am and 9:00am on the day of appointment for the measurement of fasting capillary blood glucose (FCG) using the HemoCue® B-Glucose photometer [78-82].

In order to compare the results of the present study to those of the 2003 baseline survey [77], a cut off of FCG ≥ 6.1mmol/l and/or on diabetes medication (insulin or oral therapy) was used in the analysis. The cut off point of FCG ≥ 6.1mmol/l includes participants with IFG and those diagnosed with diabetes as defined by WHO/IDF report of 2006 [83]. Previous studies using cut off point of FCG≥6.1 mmol/l have demonstrated that approximately 75% of people with diabetes detected in epidemiological studies were confirmed to have clinical diabetes [84, 85], if repeat testing is done. All participants aged 25 years and above with a FCG ≥ 7.0mmol/l (126mg/dl) [83] and/or on diabetes medications (insulin or oral therapy) were considered as diabetic in another analysis.

Blood pressure was measured by a medical doctor using fully automated Omron M3 machines with the participant seated for at least five minutes, legs uncrossed and the arm resting on table. Presence of contra indicators like pacemaker, pregnancy and arrhythmias was verified before blood pressure was measured. Participants with SBP≥140 and/or DBP≥90mmHg and/or on hypertensive medication were considered to be hypertensive.

For household members who were not present, it was ascertained when would be a good time to return. If no one was present at the household, neighbours were asked for the best time to return. If no information was available from neighbours then up to two more visits were made: one in the evening and one at a weekend. If no contact was established after 3 visits the household was classified as a 'non-response' household.

2.1.6 Data preparation and analysis

For secondary data analysis, the following variables were selected:

- Demographic variables; age (years), gender (male, female), marital status (married, single, divorced, widow/er and others – which includes: separated, widow remarried, divorced remarried, cohabitating)

- Exposure variables; age, obesity, markers of central obesity (waist-to-hip ratio, waist circumference), smoking, hypertension, alcohol consumption, consumption of fruits and vegetables, use of added sugar and physical activity at work and at leisure / recreation
- Outcome variable was abnormal glucose ascertained by FCG≥6.1 mmol/l and/or diabetes medication on one hand and on the other FCG≥7.0 mmol/l and/or diabetes medication

2.1.7 Data entry and transfer

Data entry was done using the latest version of Epi data® (version 3.1). Data was exported from Epi data to STATA and cleaning was done by checking for missing values, consistencies and validity of responses. Data analysis was performed using STATA (version 10).

2.2 Descriptive analysis

Exposure variables are represented as means, percentages or frequency tables. Test of means and proportions was done using student's t test and Chi square values and 95% confidence limits (CI) were given. P-values were calculated for statistical significance at 5% significance level.

2.3 Inferential analysis

The association between risk factors and IFG/diabetes was investigated by Chi-square analysis, and univariate and multivariate logistic regression taking into account potential confounding. Interaction was assessed between waist-hip-ratio and BMI, waist-hip-ratio and waist circumference and BMI and waist circumference and also between sex and markers central obesity, sex and BMI.

2.4 Ethical considerations

Ethical clearance was obtained from the Cameroon National Ethical Committee (Appendix G). Participants gave informed consent prior to inclusion in study (English version on page 2 of adult questionnaire: Appendix E) by either signing or thumb printing on the informed consent form, a copy of which was given to the participant. The participants were under no obligation to partake in the survey as stated on the informed consent. Confidentiality of all information obtained from individuals and households was assured by safely and securely storing the questionnaires out of the reach of non-staff persons in a secured room with keys kept by the data manager. Results of the physical and biochemical examinations were kept confidential. All participants individually received feedback on the results of their examinations and were referred where necessary to Biyem Assi hospital–Yaoundé for appropriate follow up. Authorisation to use the anonymised data set for the current secondary data analysis was obtained from the Director of Health of Populations in Transition (HoPiT) Research Group Cameroon (Appendix H). Ethical approval of the research entitled *"An analysis of diabetic risk factors in Yaoundé, Cameroon"* was given by the Human Research Ethics Committee (Medical) of the University of the Witwatersrand No M090944 (Appendix I).

CHAPTER THREE

RESULTS

INTRODUCTION

The results are given as descriptive and inferential analysis and are presented in tables and figures. Descriptive results are presented as socio-demographic characteristics, anthropometric and diet characteristics. Diabetes status of the study population is also presented. Inferential analyses were assessed by univariate and multivariate analysis of risk factors for diabetes.

3.1 DESCRIPTIVE ANALYSIS

3.1.1 Demographic characteristics of the study population

Socio - demographic characteristics of the study population are presented in table 1 below.

1 712 participants were included in the statistical analysis. Men constituted 41.1% and women 58.9% of the study population. The mean age of the study population was 39.5 (±13.0) years. The minimum age was 25 years, the maximum 89 years.

Participants whose average annual earnings ranged from zero FCFA to FCFA 400 000 were classified as having a very low, FCFA 400 001 to FCFA 1 000 000 a low, FCFA 1 000 001 to FCFA 3 000 000 a medium and FCFA 3 000 001 and above a high income. 30.0% participants were considered to have a very low, 23.0% a low, 37.1% a medium and 9.9% a high income.

A higher percentage of men had a high income as compared to women as 67.7% of the very low income earners were women, whereas only 21.8% of them were considered as high income earners.

The highest percentage of very low income earners were women aged 65+ and the highest percentage of high income earners were men aged 65+.

51.6% of the participants were married, 37.2% single, 1.4% divorced, 6.3% widows or widowers and 3.5% others[4]. 7.0% of respondents reported their highest level of education as less than primary school, 15.5% to have completed primary school, 25.1% to have completed secondary school, 25.1% to have completed high school and 27.4% have at least a bachelor's degree or post graduate qualification.

37.2% respondents were civil servants or private sector employees, 16.3% were self employed or living on subsistence farming, 14.1% were students, 19.0% were housekeepers or retired and 13.3% were unemployed.

31.5% respondents were from Centre province, 9.0% from South, 1.9% from East, 7.1% from Littoral, 3.3% from South West, 10.1% from North West, 34.2% from West, 0.7% from Adamawa, 1.1% from North and 0.9% from Far North province.

[4] Others included: separated, widow(er) remarried, divorced remarried, cohabitating

Table 1:
Socio demographic characteristics of the residents of Biyem Assi, Yaoundé, 2007

Variable	Males, N (%)	Females, N (%)	Total, N (%)
Age Group	**704 (41.1)**	**1008 (58.9)**	**1 712**
25-34	344 (48.9)	485 (48.1)	829 (48.4)
35-44	100 (14.2)	187 (18.6)	287 (16.8)
45-54	116 (16.5)	225 (22.3)	341 (19.9)
55-64	111 (15.8)	72 (7.1)	183 (10.7)
65+	33 (4.7)	39 (3.9)	72 (4.2)
Marital status	**701 (41.1)**	**1 003 (58.9)**	**1 704**
Married	368 (52.5)	512 (51.1)	880 (51.6)
Single	288 (41.1)	346 (34.5)	634 (37.2)
Divorced	8 (1.1)	15 (1.5)	23 (1.4)
Widow (er)	15 (2.1)	92 (9.2)	107 (6.3)
Others	22 (3.1)	38 (3.8)	8 (3.5)
Occupation	**665 (41.3)**	**946 (58.7)**	**1 611**
Civil servant/Private sector employee	310 (46.6)	290 (30.7)	600 (37.2)
Self employed/non paid subsis. farming	104 (15.6)	159 (16.8)	236 (16.3)
Student	102 (15.3)	125 (13.2)	227 (14.1)
Retired/House keeper	84 (12.6)	222 (23.4)	306 (19.0)
Unemployed/others	65 (9.8)	150 (15.9)	215 (13.3)
Highest level of education	**696 (41.0)**	**1 000 (58.9)**	**1 696**
Less than primary	34 (4.9)	85 (8.5)	119 (7.0)
Completed primary school	79 (11.4)	183 (18.3)	262 (15.4)
Completed secondary school	138 (19.8)	287 (28.7)	425 (25.1)
Completed high school	187 (27.2)	236 (23.6)	425 (25.1)
Completed university	265 (36.8)	209 (20.9)	465 (27.4)
Level of income	**279 (50.2)**	**277 (49.8)**	**556**
Very low	54 (19.4)	113 (40.8)	167 (30.0)
Low	68 (24.4)	60 (21.7)	128 (23.0)
Medium	114 (40.9)	92 (33.2)	206 (37.1)
High	43 (15.4)	12 (4.3)	55 (9.9)
Province of origin	**700 (41.0)**	**1 006 (58.9)**	**1 706**
Centre	219 (31.3)	319 (31.7)	538 (31.5)
South	63 (9.0)	91 (9.1)	154 (9.0)
East	11 (1.6)	23 (2.3)	34 (1.9)
Littoral	45 (6.4)	76 (7.6)	121 (4.1)
South West	31 (4.4)	26 (2.6)	57 (3.3)
North West	65 (9.3)	108 (10.7)	173 (10.1)
West	238 (34.0)	346 (34.4)	584 (34.2)
Adamawa	6 (0.9)	6 (0.6)	12 (0.7)
North	11 (1.6)	7 (0.7)	18 (1.1)
Far North	11 (1.6)	4 (0.4)	15 (0.9)

Subsequent tables (Tables: 2–33) and figures (Figures: 1–23) give additional information on the study population.

3.1.2 Prevalence of IFG/diabetes

The mean fasting capillary blood glucose was 5.32 mmol/l (95% CI: 5.16–5.47), and was higher in women with on average 5.38 mmol/l, (95% CI: 5.16–5.60) than in men with 5.22 mmol/l, (95% CI: 5.03–5.41). FCG increased with age, the highest average value of 5.60 mmol/l (95% CI: 4.95–6.25) was found among male participants aged 55 – 64 years.

132 participants had FCG≥6.1 mmol/l and/or were on diabetes medication. 60 (44.45%) of them were men and 72 (54.55%) women. The prevalence of IFG/diabetes was thus 7.7% in the study population, 8.5% in men and 7.1% in women. Generally, prevalence of IFG/diabetes in the study population gradually increased from age group 25–34 to 55–64 years and decreased in those aged 65 years and older. A higher percentage of women had FCG≥6.1 mmol/l than men in the age groups 25–34, 45–54 and 65+ years whereas amongst the age bracket of 35–44 and 55–64 years old more men had FCG≥6.1 mmol/l than women.

Using the cut off point of FCG≥7.0 mmol/l and/or use of diabetes medication, 58 participants were diabetic. 30 (51.7%) of them were men and 28 (48.3%) women. The prevalence was 3.4% in the study population, 4.3% among men and 2.8% among women.

78 respondents were classified as having IFG, though four of them were on oral anti-diabetic therapy. When the four respondents with FCG≥7.0 mmol/l and on oral therapy but FCG within the range of the definition of IFG were excluded from the analysis, prevalence of impaired fasting glucose only (FCG>6.0 mmol/l but <7.0 mmol/l) was 4.3%, 4.3% among men and 4.4% among women in the study population. 30 (40.5%) of them were men and 44 (59.5%) women.

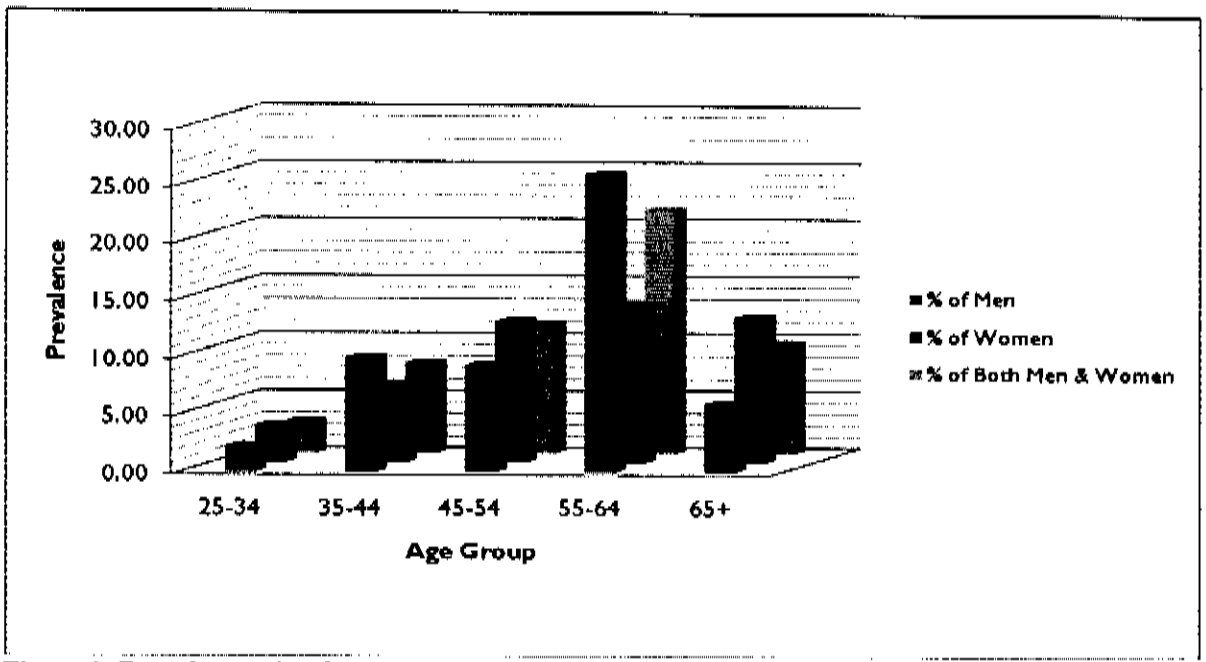


Figure 1: Prevalence of IFG/diabetes (FCG≥6.1 mmol/l) and/or use of diabetes medication amongst 1 712 respondents in Yaoundé, Cameroon, 2007

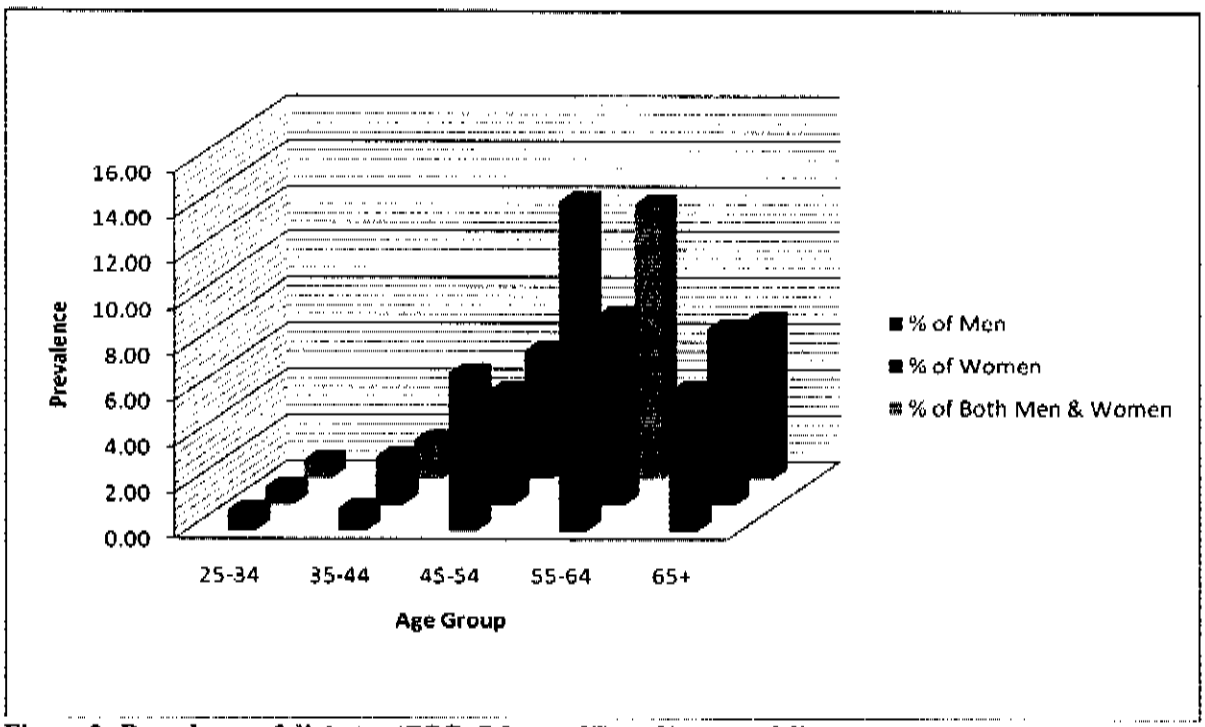


Figure 2: Prevalence of diabetes (FCG≥7.0 mmol/l) and/or use of diabetes medication amongst 1 712 respondents in Yaoundé, Cameroon, 2007

1 102 (87.88%) respondents had their FCG values between 4.0 and 6.0 mmol/l and 34 participants (1.96%) had FCG values between 2.8 and 3.9mmol/l. 113 (6.60%) respondents had FCG values between 6.1 and 21.1mmol/l.

3 respondents reported to be both on insulin treatment and oral therapy while 8 respondents were on insulin treatment only, 20 on oral therapy only. One (12.5%) participant on insulin treatment and 12 (60.0%) participants on oral therapy had FCG>6.1mmol/l, indicating poor glucose control. One (12.5%) participant on insulin therapy and eight (40.0%) participants on oral therapy had FCG>7.0 mmol/l.

3.1.3 Weight Status

About a third of the participants had a normal body weight (35.8%), one third were overweight (34.5%) and 28.4% were obese. 1.3% of the participants were underweight. Mean body mass index was 27.5 (95% CI: 27.2–27.7) and was lower in males (25.8: 95% CI: 25.5–26.1) than females (28.7: 95% CI: 28.3–29.0). 46.2% males had normal weight as compared to 28.6% females. Women were more often obese (37.0%) than men (16.1%). More males (36.4%) than females (33.2%) were overweight. The most overweight participants were aged 55–64 years. Obesity was most prevalent in the age group 45–54 years followed by those aged 35–44 years of age.

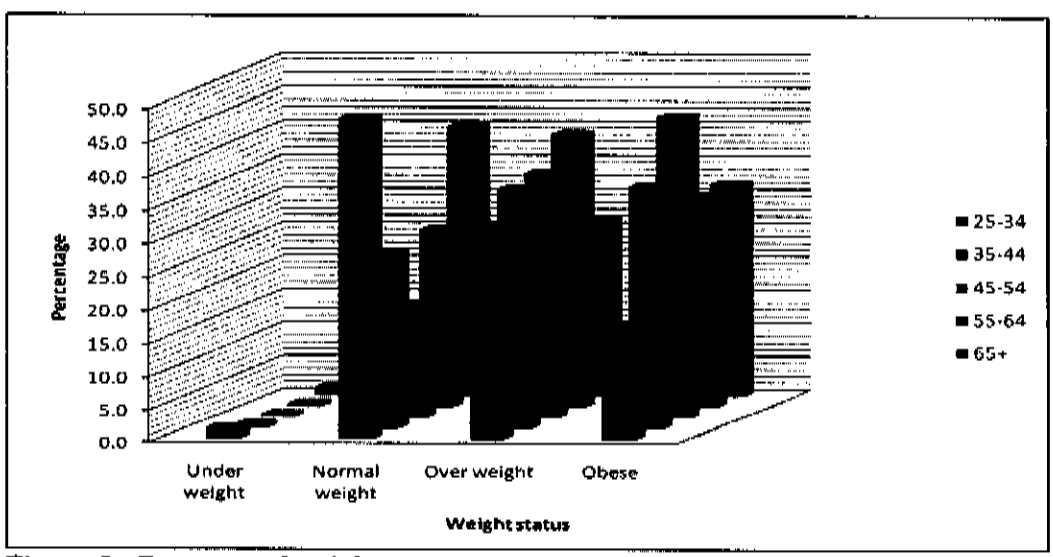


Figure 3: Category of weight status by age group, N=1712, Yaounde, Cameroon, 2007

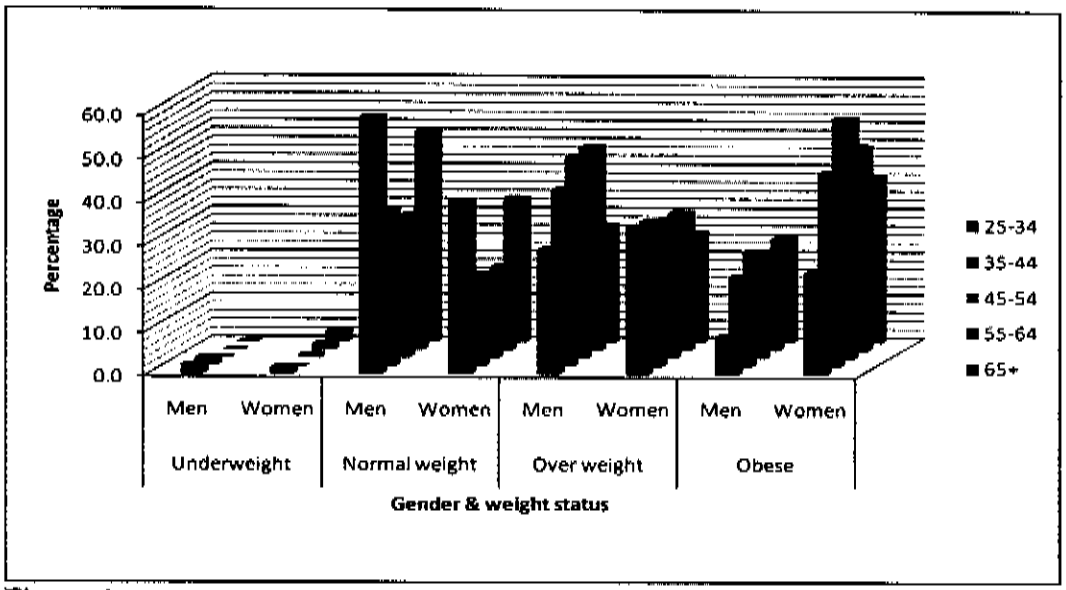


Figure 4: Weight status by gender and age group, N=1712, Yaounde, Cameroon, 2007.

3.1.4 Waist-to-hip ratio

36.5% of the participants had a waist-to-rip ratio (WHR) above normal (>0.9 for men and >0.85 for women). Elevated WHR was more pronounced in men (37.4%) than women (35.9%). In both men and women, WHR above normal increased as they advance in age.

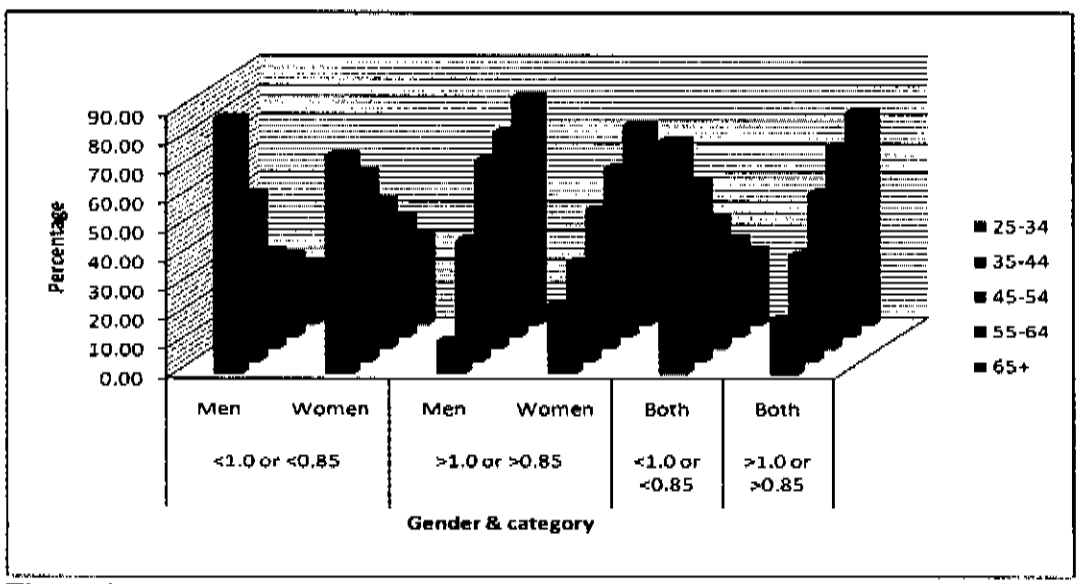


Figure 4: Waist to hip ratio by gender and age group, N=1712, Yaounde, Cameroon, 2007.

3.1.5 Waist circumference

19.1% of the participants had a waist circumference greater or equal to 94 cm but less than 102 cm in men and greater than or equal to 80 cm and less than 88 cm in women. 34.8% of the participants'

waist circumference was greater than 102 cm in men and greater than 88 cm in women. A higher percentage of women had a higher waist circumference as compared to men. As age increased there was an increase in waist circumference (≥94 cm in men and ≥ 80 in women) in both men and women. Mean waist circumference was 88.3 cm (95% CI: 87.7–88.8), 87.5 cm (95% CI: 86.7–88.4) among men and 88.8 cm (95% CI: 86.7–88.4) among women.

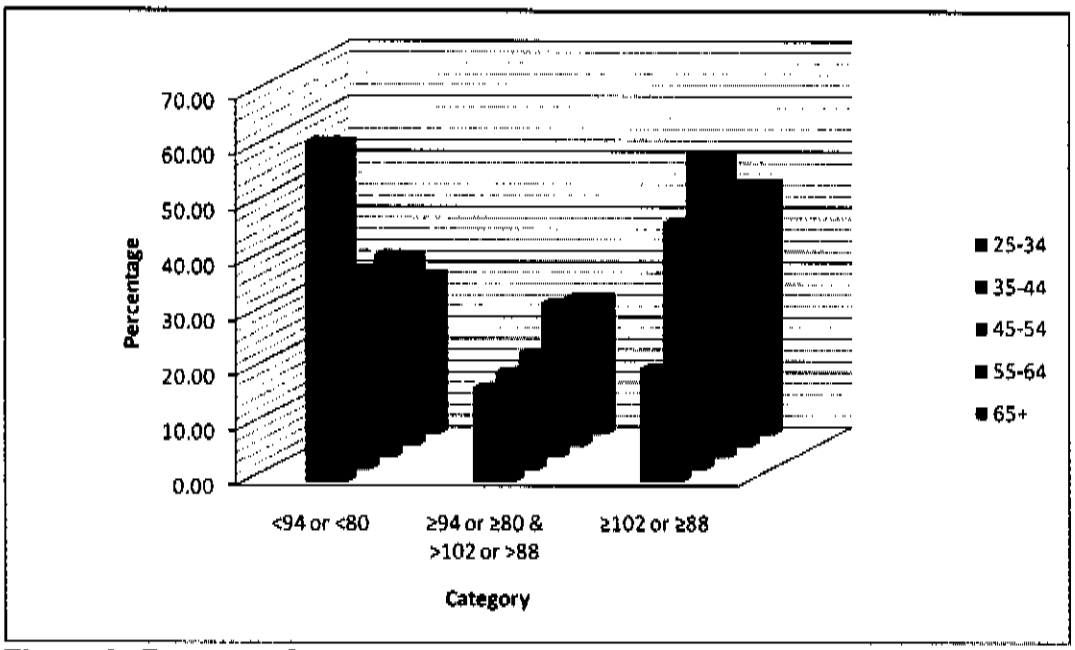


Figure 6: Category of waist circumference in both men and women, N=1712, Yaounde, Cameroon, 2007.

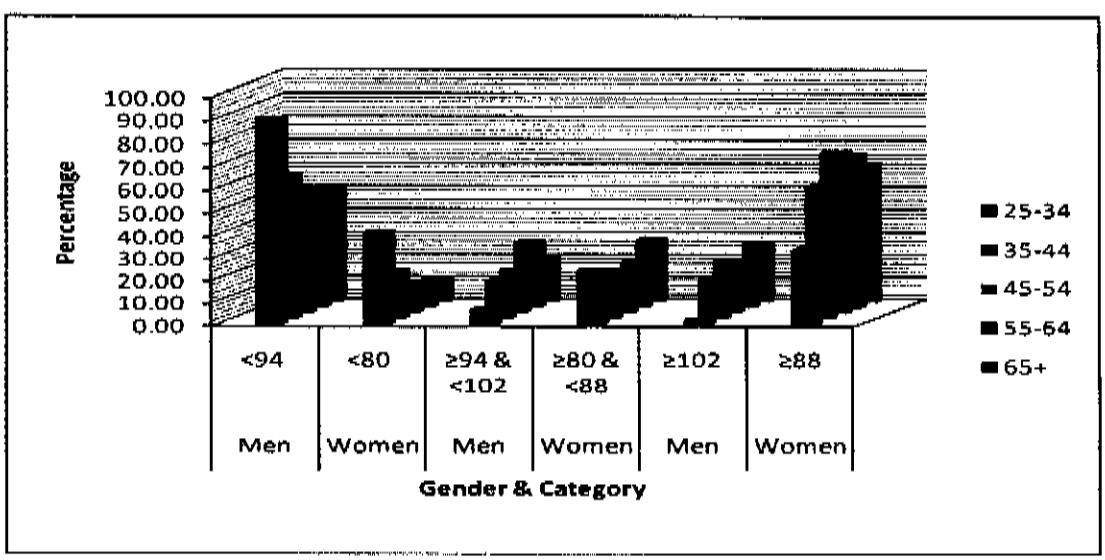


Figure 7: Waist circumference in men and women by category and age group, N=1712, Yaounde, Cameroon, 2007.

3.1.6 Prevalence of hypertension

447 (26.1%) of the participants were hypertensive of whom 21.3% were aware of their hypertension and receiving treatment while 78.7% were newly diagnosed. Of the 447 hypertensive participants, 47.2% were men and 52.8% women. The percentage of hypertensive men was higher as compared to women in all the age groups except 55-64 years. The prevalence of hypertension increased with age in both men and women. Mean blood pressure levels were significantly higher among men than women. The mean SBP was 132.8 (95% CI: 131.3–134.4) among men versus 123.4 (95% CI: 122.1–124.7) among women and DBP was 79.7 (95% CI: 78.7–80.7) among men versus 77.1 (95% CI: 76.3–77.8) among women. Among men, mean blood pressure levels increased from 125.2 SBP (95% CI: 123.8–126.5) and 74.7 DBP (95% CI: 73.6–75.9) among those aged 25–34 to 157.6 SBP (95% CI: 148.5–166.7) and 87.0 DBP (95% CI: 84.3–89.7) among men aged 55–64. Among women, mean levels increased from 114.8 SBP (95% CI: 113.8–115.9) and 72.8 DBP (95% CI: 71.9–73.7) among those aged 25–34 to 151.7 SBP (95% CI: 142.4–161.1) among those age 25–34 and 83.3 DBP (95% CI: 81.6–84.9) among those aged 45–54.

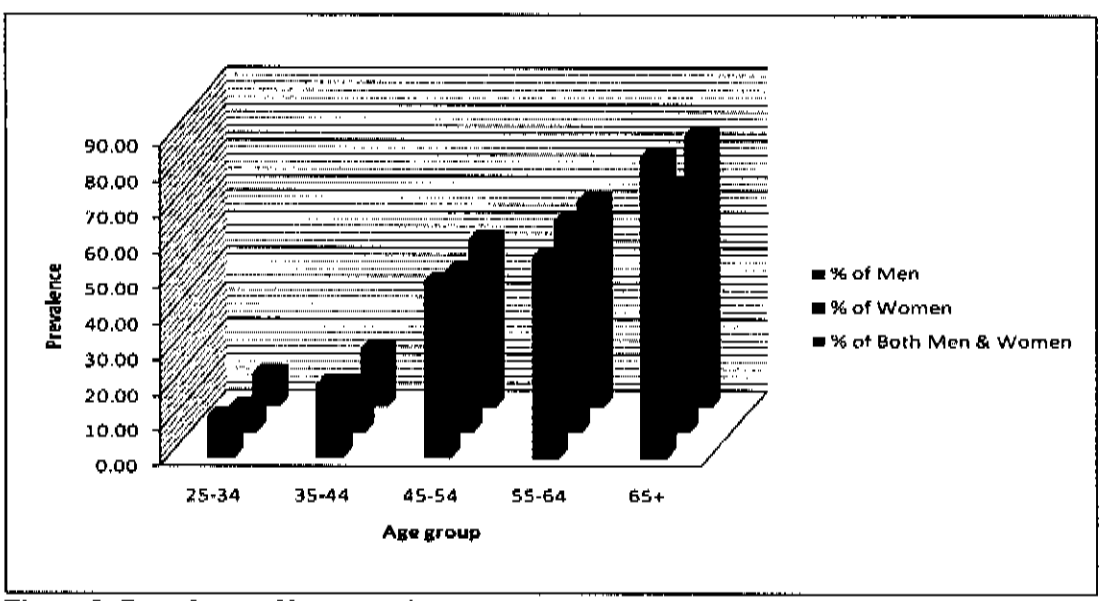


Figure 8: Prevalence of hypertension amongst 1 712 respondents in Yaoundé, Cameroon, 2007

3.1.7 Tobacco consumption

73.2% participants were non smokers, 16.8% were former smokers, 7.6% were current smokers and 2.4% former smokers reported using smokeless tobacco. 455 (26.8%) participants reported having smoked tobacco products such as cigarettes, cigars or pipes or currently using smokeless tobacco such as snuff or chewing tobacco. 333 (47.3%) men reported having smoked tobacco products or were using smokeless tobacco as compared to 122 (12.1%) women. 89.1% participants who reported that they currently smoked were males while 10.9% were females.

Generally, the percentage of current smokers increased up to age group 35–44 years and gradually decreased to the lowest at 65+ years. The percentage of current male smokers increased from age group 25–34 years to age group 45–54 years. The highest percentage of non smokers was made up of participants aged 25–34, seconded by age group of 45–54. The percentage of ex–smokers taking smokeless tobacco was highest at the age interval of 65+ and decreased gradually to lowest at 25–34.

In all age groups men smoked more often than women. The percentage of current male smokers increased from 25–34 years to 45–54 years and gradually decreased thereafter while in females the percentage of smokers increased from 25–34 to 35–44 years and gradually decreased thereafter. The same trend was observed for male and female ex– smokers.

On average current smokers started smoking at 20.6 years (95% CI: 19.2–22.0) and smoked 10.7 (95% CI: 8.3–13.2) manufactured cigarettes per day.

Ex smokers started smoking on average at 20.9 years (95% CI: 19.7–22.1) and stopped smoking at 33.5 years (95% CI: 31.2–35.9). 28.0% indicated that they had stopped because of health related problems.

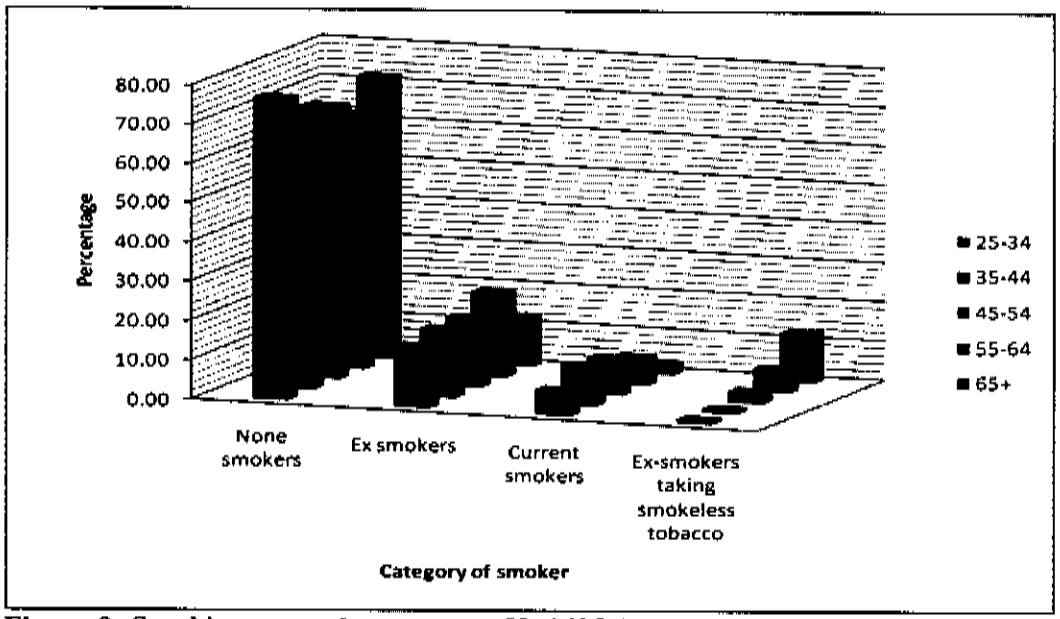


Figure 9: Smoking status by category, N=1695, Yaoundé, Cameroon, 2007

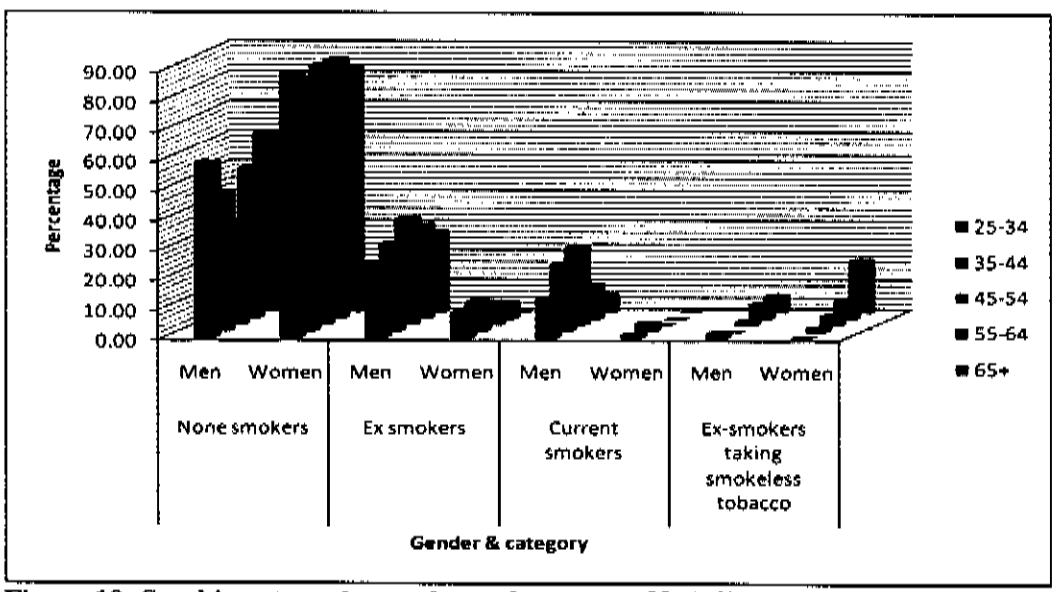


Figure 10: Smoking status by gender and category, N=1 695, Yaoundé, Cameroon, 2007

3.1.8 Alcohol consumption

Alcohol consumption was widespread. 83.7% of participants reported that they once consumed alcoholic drinks such as beer, wine, spirit or local brews as palm wine, corn beer, "bili bili". "arki" or "afofo". 65.5% of participants reported that they currently consume alcohol, 18.2% that they previously consumed alcohol and 16.3% reported to abstain from alcohol consumption. The highest alcohol consumption was reported by those aged 25–34 years (men 91.2%, women 78.5%).

Men reported more often current alcohol consumption than women across the different age groups and were less often abstainers.

More males than females reported consumption of wine, palm wine, whisky, "bili bili" or corn beer and "arki". Beer was the most consumed alcoholic drink, specifically in men (70.9%), but also in women (49.8%). On average two beers of beer were consumed per day.

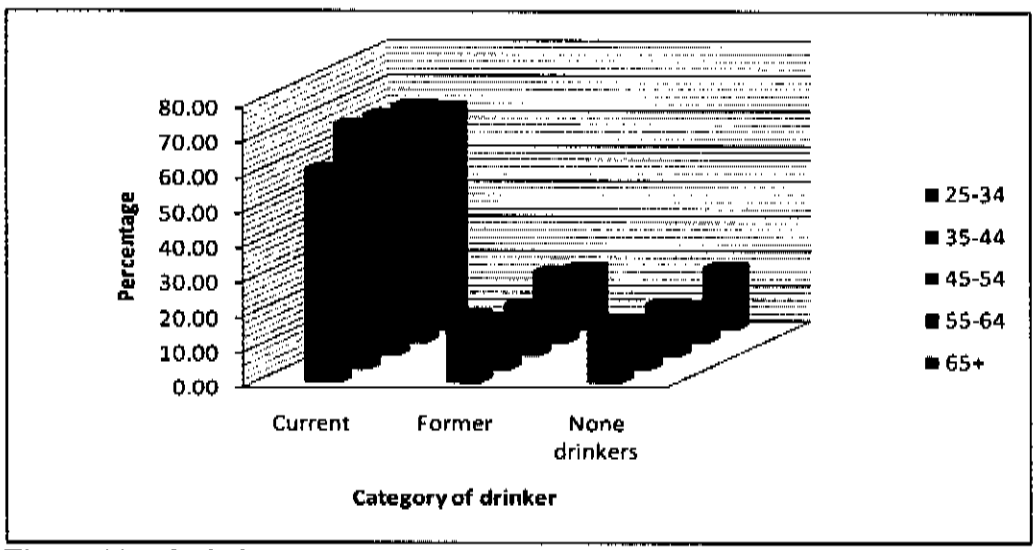


Figure 11: Alcohol consumption by category, N=1701, Yaoundé, Cameroon, 2007

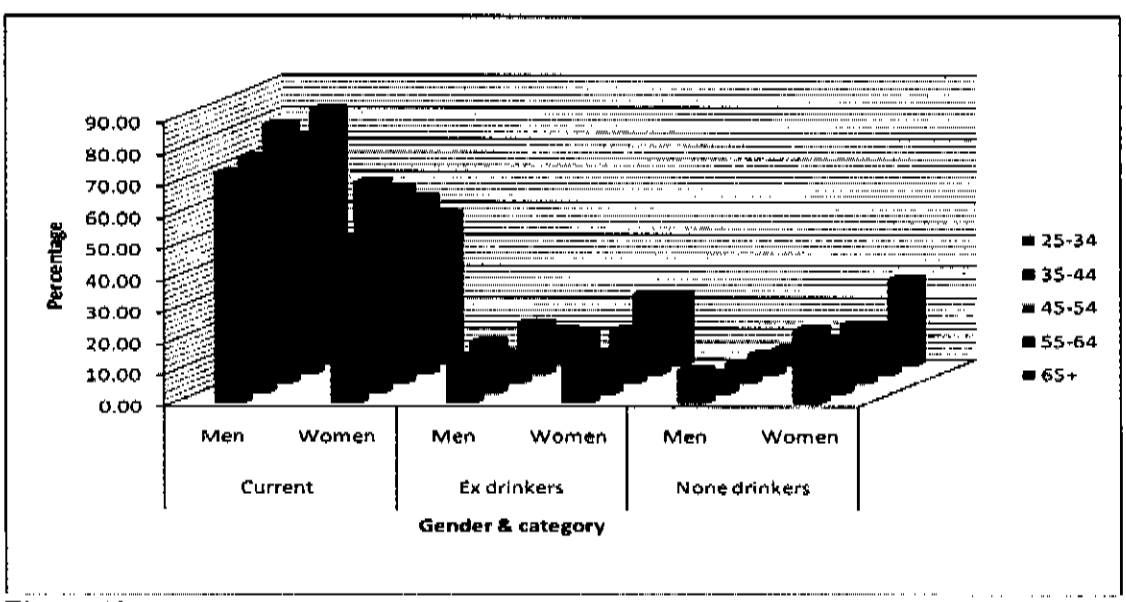


Figure 12: Alcohol consumption by gender and age group, N=1701, Yaoundé, Cameroon, 2007

3.1.9 General physical activity

1 006 (61.5%) participants of the studied population reported being involved in low, moderate or vigorous activity whereas 38.5% reported not taking part in any form of physical activity. Low intensity physical activity (51.8%) was reported by men and women of all age groups most often, followed by moderate intensity physical activity (5.4%). 4.3% of the participants reported vigorous physical activity.

Low intensity physical activity was practised most by participants aged 45–54, followed by 55–64 and least by those aged 35–44. Participants aged 25–34 practised moderate physical activity most, followed by those in the age interval of 45–54 while those aged 64+ carried out the least moderate physical activity. Participants in the age bracket of 25–34 carried out vigorous physical activity most, followed by those aged 45–54 and the 34–44 age group.

53.9% of the women carried out low intensity physical activity as against 48.7% of the men. 6.6% men practised vigorous physical activity as against 2.8% in women. The level of moderate activity differs slightly between, men (4.5%) and women (6.0%).

Older men practised less vigorous activity. Change in vigorous activity in women followed no trend.

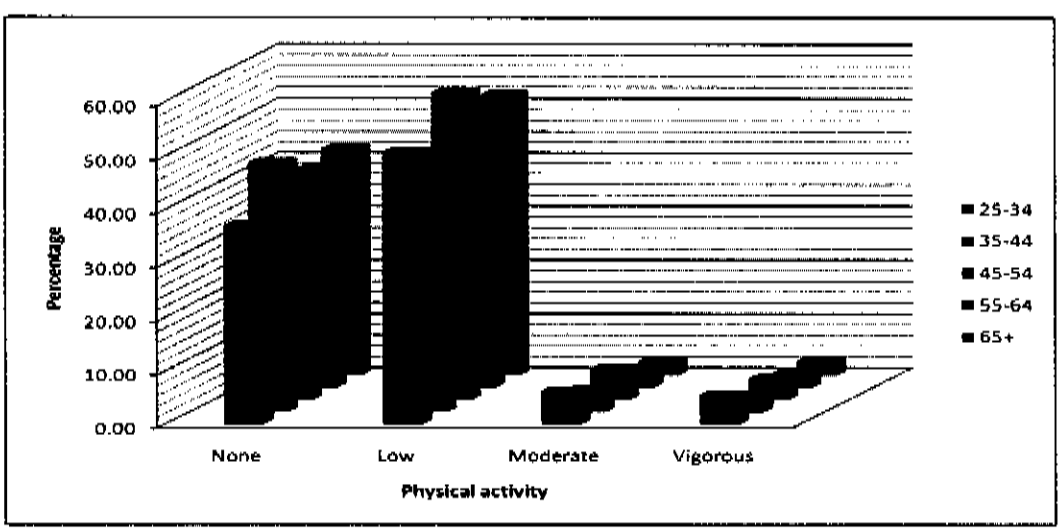


Figure 13: General physical activity by age group, N=1636, Yaoundé, Cameroon, 2007

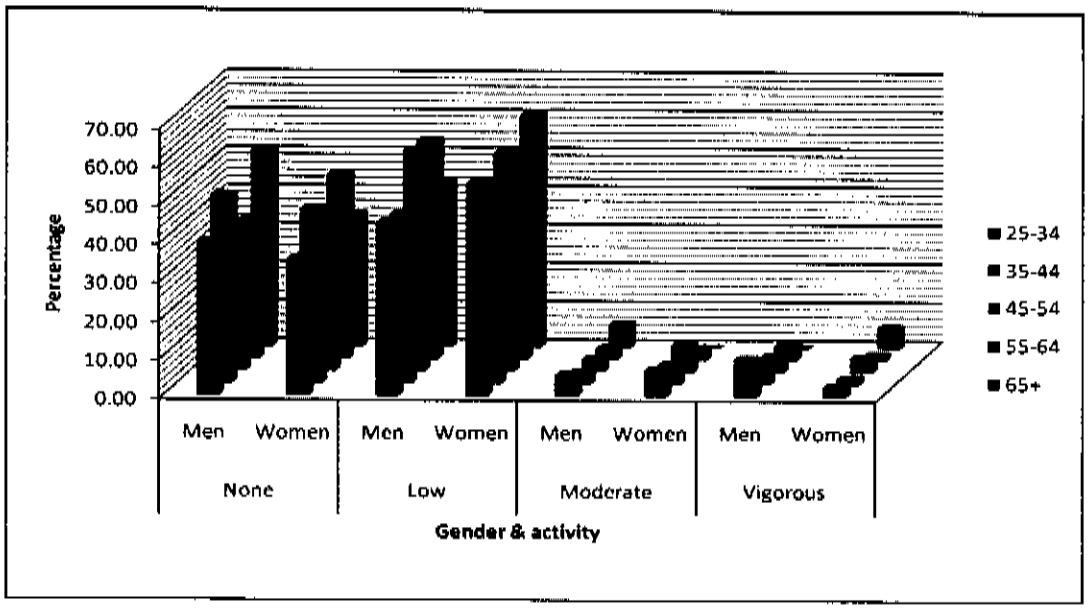


Figure 14:
Physical activity by gender and age group, N=1636, Yaoundé, Cameroon, 2007

3.1.10 Physical activity at leisure / recreation

No leisure/recreational activities were reported by 5.5% of the study participants (men 4.9%, women 5.9%). Low intensity leisure/recreational activities was reported by 85.9% study participants, 2.6% reported moderate intensity and 6.1% reported vigorous physical activity at leisure/recreation. The age group of 25–34 was the most active at leisure/recreation and participant aged 65+ were the least active.

Women in all the age groups reported a higher percentage of low physical activity at leisure/recreation than men. More men reported vigorous physical activity at leisure/recreation than women.

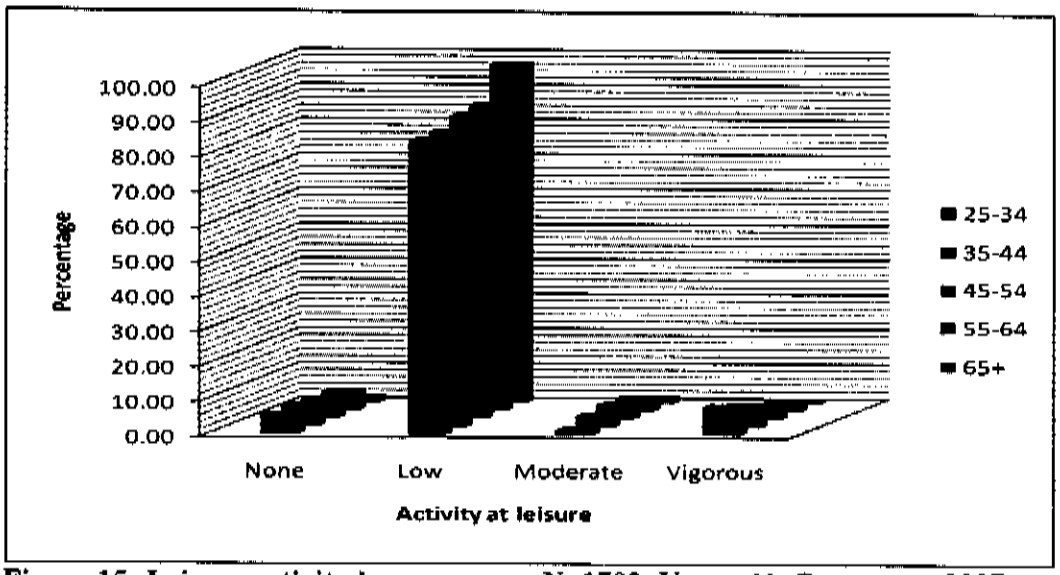


Figure 15: Leisure activity by age group, N=1702, Yaoundé, Cameroon, 2007

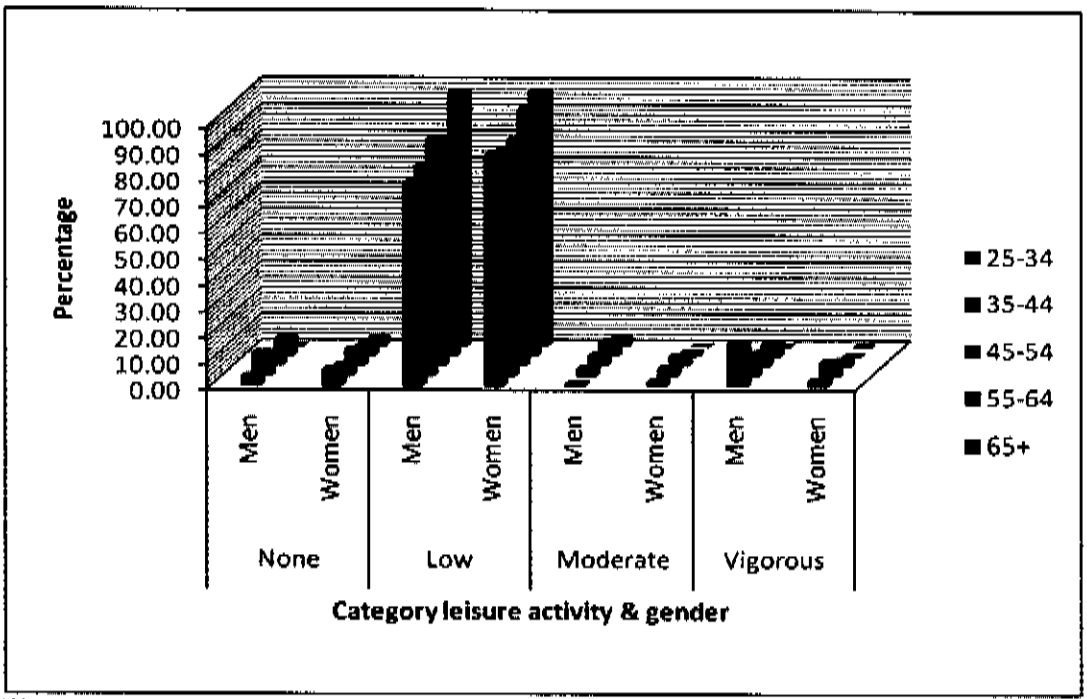


Figure 16: Leisure activity by gender & age group, N=1702, Yaoundé, Cameroon, 2007

3.1.11 Dietary habits

3.1.11.1 Fruit and vegetable consumption

Majority of the participants reported fruit (86.6%) and vegetable (97.7%) consumption at least once a week. 2.3% respondents did not report eating vegetables at least once a week as compared to 13.3% for fruits. Vegetables were consumed more often than fruits in all age groups and more often by females (vegetables consumption 58.6% and fruit consumption 89.2%) than males (vegetables

consumption 39.1% and fruit consumption 86.1%). Older women reported higher consumption of fruits whilst men aged 35–44 years reported lowest consumption.

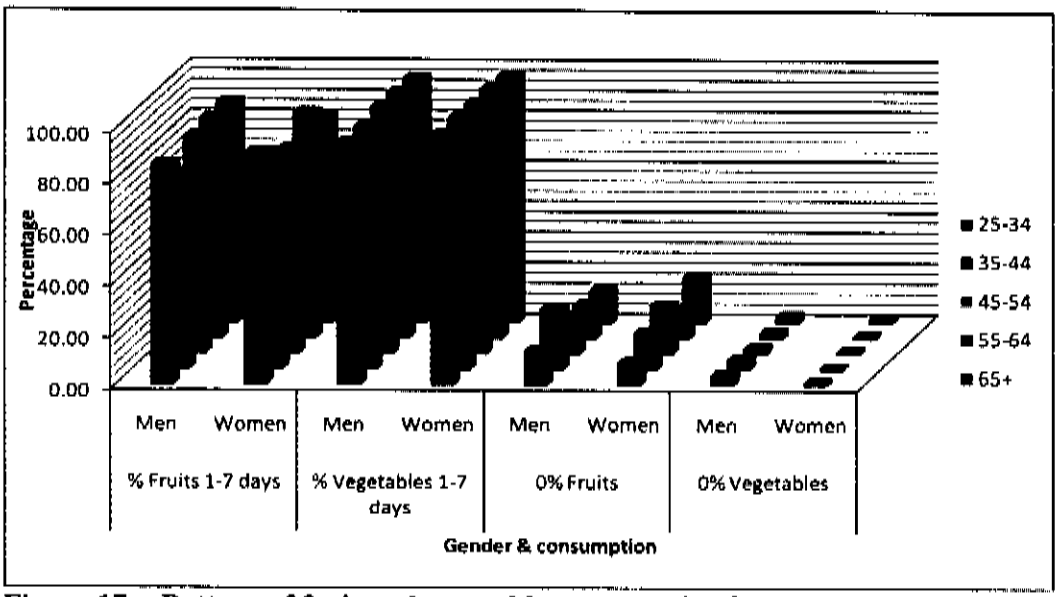


Figure 17 : Pattern of fruit and vegetable consumption by gender and age group, N=1550 fruits, N=1641 vegetables, Yaounde, Cameroon, 2007

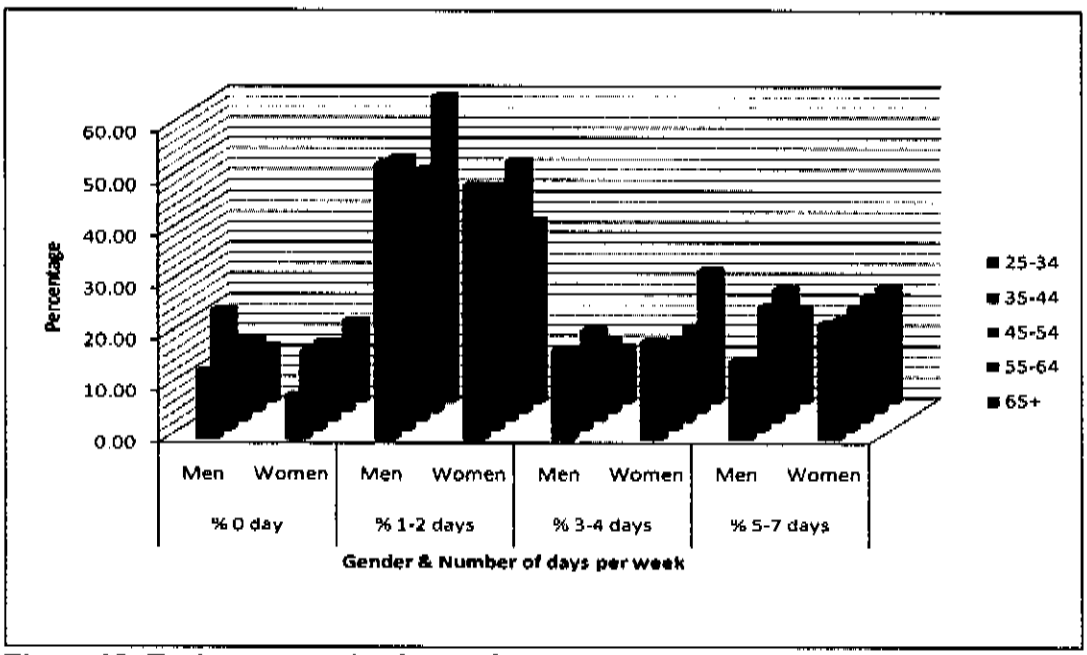


Figure 18: Fruit consumption by gender and age group, N=1550, Yaounde, Cameroon, 2007

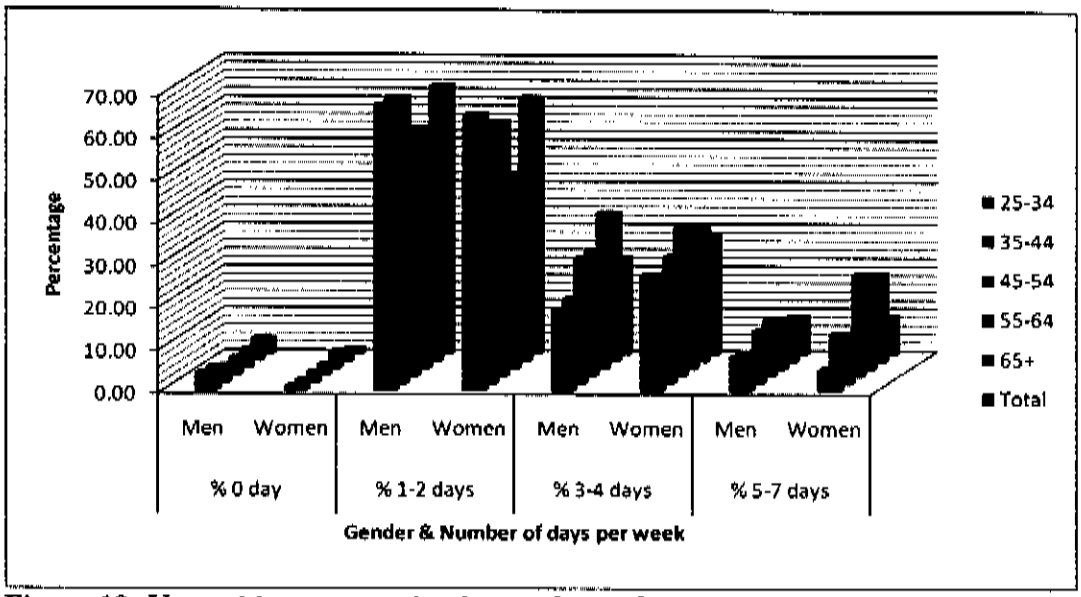


Figure 19: Vegetable consumption by gender and age group, N=1641, Yaounde, Cameroon, 2007

3.1.11.2 Addition of sugar to tea/coffee

On average 27.7% participants (men: 43.6%, women: 56.4%) reported always adding sugar to tea/coffee. The youngest age groups reported highest use of added sugar. A decrease in added sugar to tea/coffee was reported with increasing age.

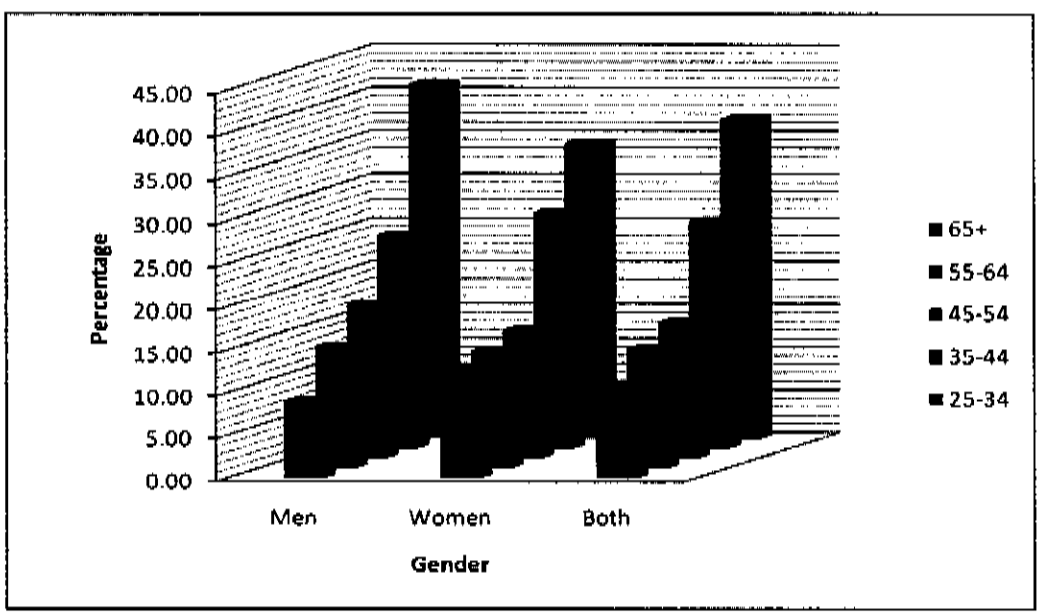


Figure 20: Sugar consumption by gender and age group, N= 1706 sugar, Yaoundé, Cameroon, 2007

3.2 Description of study participants according to IFG/diabetes status

Diabetic participants were more often older, obese, hypertensive, had elevated waist circumference and WHR, were less often single, more often retired and reported more often adding sugar to tea/coffee as summarized in table 2.

Table 2: Description of study participants according to IFG/diabetes status

Variable	IFG/Diabetic, N (%)	Non IFG/Diabetic, N (%)	P-value
Gender (n=1712)			
Male	60 (8.5)	644 (91.5)	
Female	72 (7.1)	936 (92.9)	0.292
Age Group (n=1712)			
25-34	24 (2.9)	805 (97.1)	
35-44	23 (8.0)	264 (92.0)	
45-54	39 (11.4)	302 (88.6)	
55-64	39 (21.3)	144 (78.7)	
65+	7 (9.7)	65 (90.3)	0.000
Marital status (n=1704)			
Married	90 (10.2)	790 (89.8)	
Single	21 (3.3)	613 (96.7)	
Others	20 (10.5)	170 (89.5)	0.000
Occupation (n=1611)			
Civil servant/Private sector	52 (8.7)	548 (91.3)	
Self employed/non paid subsistence farming	18 (6.8)	245 (93.2)	
Student	4 (1.8)	223 (98.2)	
Retired/House keeper	36 (11.8)	270 (88.2)	
Unemployed	10 (4.7)	205 (95.3)	0.000
Highest level of education (n=1696)			
Less than primary	11 (9.2)	108 (90.8)	
Completed primary school	22 (8.4)	240 (91.6)	
Completed secondary school	35 (8.2)	390 (91.8)	
Completed high school	30 (7.1)	395 (92.9)	
Completed university	33 (7.1)	432 (92.9)	0.873
Level of income (n=556)			
Very poor	12 (7.2)	155 (92.8)	
Poor	6 (4.7)	122 (95.3)	
Medium	16 (7.8)	190 (92.2)	
Rich	6 (10.9)	49 (89.1)	0.486
Weight status (n=1712)			
Normal	33 (5.2)	602 (94.8)	
Overweight	47 (7.9)	544 (92.1)	
Obese	52 (10.7)	434 (89.3)	0.003
Waist to hip ratio (n=1712)			
<0.9 or <0.85	53 (4.9)	1 034 (95.1)	
>0.9 or >0.85	79 (12.6)	546 (87.4)	0.000

Waist circumference (n=1712)	43 (5.5)	746 (94.5)	
≤94 or ≤80 cm	20 (6.1)	307 (93.9)	
94> & <102 or 80> & <88 cm	69 (11.6)	527 (88.4)	0.000
≥102 cm or ≥88cm			
Hypertension (n=1712)			
Yes	53 (11.9)	394 (88.1)	
No	79 (6.2)	1 186 (93.8)	0.000
Smoking (n=1694)			
Never	98 (7.7)	1 178 (92.3)	
Former	22 (7.7)	265 (92.3)	
Current	10 (7.6)	121 (92.4)	1.000
Alcohol consumption (n=1701)			
Never	21 (7.6)	257 (92.4)	
Former	25 (8.1)	284 (91.9)	
Current	86 (7.7)	1 028 (92.3)	0.967
General physical activity (n=1636)			
None	37 (5.9)	593 (94.1)	
Low intensity	74 (8.7)	773 (91.3)	
Moderate activity	4 (4.6)	84 (95.4)	
Vigorous activity	8 (11.3)	63 (88.7)	0.078
Walking/Cycling for at least 10 minutes (n=1696)			
Yes	102 (7.2)	1 305 (92.8)	
No	27 (9.3)	262 (90.7)	0.221
Activity during recreation /leisure (n=1702)			
None	2 (2.2)	91 (97.9)	
Low intensity	115 (7.9)	1 347 (92.1)	
Moderate activity	4 (9.1)	40 (90.9)	
Vigorous activity	8 (7.8)	95 (92.2)	0.237
Fruit consumption / week (n=1550)			
O day	22 (10.6)	185 (89.4)	
1-2 days	46 (6.0)	715 (93.9)	
3-4 days	31 (11.7)	235 (88.4)	
5-7 days	29 (9.2)	287 (90.8)	0.013
Vegetable consumption / week (n=1641)			
1-2 days	70 (6.9)	950 (93.1)	
3-4 days	38 (8.9)	391 (91.1)	
5-7 days	20 (10.4)	172 (89.4)	0.154
Adding sugar to tea / coffee (n=1706)			
Yes	16 (3.4)	456 (96.6)	
No	116 (9.4)	1 118 (90.6)	0.000

3.3 Inferential Analysis

Table 3 shows the results of the logistic regression analysis investigating the association of demographic, anthropometric, medical and lifestyle factors with IFG/diabetes.

Age was shown to be significantly associated with IFG/diabetes. Older participants had a higher likelihood of IFG/diabetes than those who were younger. (OR: 1.42, 95% CI: 1.25–1.60, p<0.0001).

Participants in the age group 35–44 years were 2.92 (95% CI: 1.62–5.26, p<0.0001) times more likely to have IFG/diabetes, ORs for age groups 45–54 years were 4.33 (95% CI: 2.56–7.32, p<0.0001), ORs for those aged 55–64 years 9.08 (95% CI: 5.30–15.57, p<0.0001) and 64+ had ORs 3.61 (95% CI: 1.49–8.70, p=0.004) compared to those in the age group 25–34.

BMI was statistically associated with IFG/diabetes. Being overweight (OR: 1.57, 95% CI: 0.99–2.49) and being obese (OR: 2.18, 95% CI: 1.38–3.43, p=0.001) was associated with increased likelihood of IFG/diabetes when compared to normal weight participants.

Both markers of central obesity were associated with IFG/diabetes. Elevated WHR (>0.9 in men and >0.85 in women) increased the likelihood of having abnormal glucose by 2.82 times (95% CI: 1.96–4.05, p<0.0001) as compared to participants with a lower waist to hip ratio (<0.9 in men and <0.85 in women). Having a higher waist circumference (≥102 cm in men and ≥88 cm in women) increased the likelihood of having IFG/diabetes by 2.27 times (95% CI: 1.52–3.37, p<0.0001) compared to those with a lower waist circumference (≤94cm in men and ≤80cm in women).

Hypertensive participants were 2.02 times (95% CI: 1.40–2.91, p<0.001) more likely to have IFG/diabetes than those who were not hypertensive.

Participants who reported always adding sugar to tea/coffee as a marker for high sugar intake were 2.95 times (95% CI: 1.73–5.04, p<0.0001) more likely to have IFG/diabetes than those who were not always adding sugar to tea/coffee.

Participants reporting general low physical activity (95% CI: 1.01–2.30, p=0.040) were 1.53 times more likely to have IFG/diabetes as compared to those not involved in any physical activity.

The odds of having abnormal glucose was 0.30 for singles (95% CI: 0.18–0.49, p<0.0001) compared to married participants.

No statistically significant association (p>0.05) was found between IFG/diabetes and the following factors: level of income, level of education, smoking status, alcohol consumption, fruit and vegetable consumption and occupation (Table 3).

Gender and all variables that gave significant results in the univariate models were included in multivariate logistic regression models to further analyse the association between selected risk factors and IFG/diabetes. The two markers for central obesity were considered in separate multivariate logistic regression analysis due to their high inter correlation. Both markers are highly associated with IFG and diabetes in multivariate adjusted models. Hosmer–Lemeshow goodness-of-fit test confirmed the appropriateness of the two multivariate adjusted models. The results of step wise multivariate regression are presented in table 3.

The factors that maintained their statistical significance after multivariate adjustment were age group (35–44 years; OR: 2.41, 95% CI: 1.23–4.70, p=0.010, 45–54 years; OR: 2.85, 95% CI: 1.48–5.45, p=0.002 and 55–64 years; OR: 5.52, 95% CI: 2.71–11.23, p<0.0001, adding sugar to tea/coffee (OR: 1.84,95% CI: 1.05–3.22, p=0.031), elevated WHR (OR: 1.72,95% CI: 1.11–2.66, p=0.014) and general vigorous activity (OR: 2.79, 95% CI: 1.19–6.54, p=0.018).

After multivariate adjustment the association for overweight (OR: 1.00, 95% CI: 0.59–1.70, p=0.987), being obese (OR: 1.22, 95% CI: 0.69–2.13, p=0.481), hypertension (OR: 1.01, 95% CI: 0.64–1.57, p=0.964) and being single (OR: 0.85, 95% CI: 0.47–1.55, p=0.616) were attenuated.

Table 3: Risk factors for IFG/Diabetes in adults aged 25 years and more in Yaoundé-2007

Factors	Univariate logistic regression			Multivariate logistic regression (n=1623)		
	OR	95% CI	p-value	OR	95% CI	p-value
Demographic variables						
Gender (n=1712)						
Female	1			1		
Male	1.20	0.84-1.73	0.293	1.05	0.68-1.62	0.803
Age Group (n=1712)						
25-34	1			1		
35-44	**2.92**	**1.62-5.26**	**0.000**	**2.41**	**1.23-4.70**	**0.010**
45-54	**4.33**	**2.56-7.32**	**0.000**	**2.85**	**1.48-5.45**	**0.002**
55-64	**9.08**	**5.30-15.57**	**0.000**	**5.52**	**2.71-11.23**	**0.000**
64+	**3.61**	**1.49-8.70**	**0.004**	2.01	0.69-5.85	0.199
Marital status (n=1704)						
Married	1			1		
Single	**0.30**	**0.18-0.49**	**0.000**	0.85	0.47-1.55	0.616
Others	1.03	0.62-1.72	0.902	0.91	0.50-1.67	0.783
Occupation (n=1611)						
Civil servant/Private sector	1					
Self employed	0.77	0.44-1.35	0.368			
Student/non paid	0.19	0.07-0.53	0.002			
Retired/House keeper	1.41	0.89-2.20	0.138			
Unemployed	0.51	0.26-1.03	0.610			
Level of income (n=556)						
Very low	1					
Low	0.63	0.23-1.74	0.378			
Average	1.08	0.49-2.36	0.832			
High	1.58	0.56-4.43	0.384			
Level of education (n=1696)						
Less than primary	1					
Completed Prim. Sch.	0.90	0.42-1.92	0.785			
Completed Sec. Sch.	0.88	0.43-1.79	0.727			
Completed High Sch.	0.74	0.36-1.53	0.426			
Completed University	0.75	0.36-1.53	0.430			
Anthropometric variables						
Weight status (n=1712)						
Normal	1			1		
Overweight	**1.57**	**0.99-2.49**	**0.053**	1.00	0.59-1.70	0.987
Obese	**2.18**	**1.38-3.43**	**0.001**	1.22	0.69-2.13	0.481
Waist to hip ratio (n=1712)						
<0.9 or <0.85	1			1		
>0.9 or >0.85	**2.82**	**1.96-4.05**	**0.000**	**1.72**	**1.11-2.66**	**0.014[1]**

0.014[1]: Model where WC is excluded and WHR and all other factors having p<0.05 retained

Waist circumference (n=1712)				
≤94 or ≤80 cm	1		1	
94> & <102 or 80>&<88cm	1.13 0.65-1.95	0.661	0.91 0.45-1.83	0.801
≥102 cm or ≥88cm	**2.27 1.52-3.37**	**0.000**	2.09 0.98-4.47	0.056[2]
Prevalence of hypertension (n=1712)				
No	1		1	
Yes	**2.02 1.40-2.91**	**0.000**	1.01 0.64-1.57	0.964
Smoking (n=1694)				
Never	1.00			
Former	0.99 0.61-1.61	0.993		
Current	0.99 0.50-1.95	0.985		
Alcohol consumption (n=1700)				
Never drank	1			
Former	1.07 0.58-1.97	0.809		
Current	1.02 0.62-1.68	0.926		
General physical activity (n=1636)				
None	1		1	
Low intensity	**1.53 1.01-2.30**	**0.040**	1.48 0.97-2.26	0.069
Moderate activity	0.76 0.26-2.19	0.616	0.89 0.30-2.63	0.838
Vigorous activity	**2.03 0.90-4.56**	**0.084**	**2.79 1.19-6.54**	**0.018**
Physical activity at recreation / leisure (n=1702)				
None	1			
Low intensity	3.88 0.94-15.97	0.060		
Moderate activity	4.55 0.80-25.86	0.087		
Vigorous activity	3.83 0.79-18.52	0.095		
Walk or cycle for at least 10 minutes (n=1696)				
No	1			
Yes	1.31 0.84-2.05	0.223		
Diet				
Adding sugar to tea/coffee (n=1706)				
No	1		1	
Yes	**2.95 1.73-5.04**	**0.000**	**1.84 1.05-3.22**	**0.031**
Fruit consumption (n=1550)				
5-7 days	1			
3-4 days	1.30 0.76-2.22	0.329		
1-2 days	0.63 0.39-1.03	0.068		
0 day	1.17 0.65-2.11	0.585		
Vegetable consumption (n=1641)				
5-7 days	1			
3-4 days	0.83 0.47-1.47	0.538		
1-2 days	0.63 0.37-1.06	0.087		

0.056[2]: The only value retained is WC in the results above in a model where WHR is excluded and WC and all other factors having $p<0.05$ retained

CHAPTER FOUR

DISCUSSION

INTRODUCTION

This chapter discusses the findings of the study, and highlights the strengths and limitations of the study. The chapter ends with recommendations for future interventions. The current study sought to describe the prevalence of IFG/type 2 diabetes (abnormal glucose), the prevalence of risk factors of IFG/type 2 diabetes and to describe the association of these risk factors with IFG/type 2 diabetes in a population of adults aged 25 years and older in Yaoundé, Cameroon in 2007 after a population–based diabetes prevention programme.

4.1 FINDINGS

The study population is representative of a developing country population / age pyramid structure with a large young population (broad base) that gradually reduces with age (narrows to the top) (Figure 24). The prevalence of abnormal FCG (FCG≥6.1 mmol/l) was 7.7% (8.5% among men and 7.1% among women) in the study population in 2007 after the population-based diabetes and hypertension prevention programme took place and was considerably higher than the prevalence at base-line in 2003 (less than 6%) that used the same cut off of FCG≥6.1 mmol/l [77]. According to WHO/IDF recommendations of 2006 for the diagnosis of diabetes [83], the prevalence of diabetes (if FCG≥7.0 mmol/l and/or on diabetes medication) was 3.4%, 4.3% among men and 2.8% among women in the study population. The prevalence of impaired fasting glucose [83] was 4.3%, 4.3% among men and 4.4% among women in the study population. Prevalence of abnormal FCG in the study population increased with age. Risk factors for diabetes and IFG/diabetes are the same in the current population-based study and were: age, high sugar intake and central obesity.

Control of blood glucose is poor in diabetics on oral medication as compared to those on insulin. Hyperglycaemia is directly linked with diabetes complications [86]. Treatment that lowers blood glucose reduces the risks of diabetic retinopathy, nephropathy, and neuropathy [87-89].

The risk of abnormal glucose increases with age. It is known that with age beta cell output falls and whole body insulin resistance increases. This may be due to increased visceral fat accumulation. As we grow old age related impairment of pancreatic beta cells develops. Cells lose lean tissue and accumulate fat especially intra abdominal fat and tissue sensitivity to insulin decrease [71]. The cells consequently become more resistant to insulin as well. As people get older there is a decline in physical and mental abilities and they tend to exercise less, lose muscle mass and gain weight. Older people may lack means and access to facilities or are prone to conditions which may restrict their nutritional improvement. Modifying lifestyle risk factors associated with IFG/type 2 diabetes are more difficult in older people. Co-morbidity of diabetes and hypertension produce a pronounced cognitive decline [90]. Adverse drug interactions may be associated with old age due to taking of various medications for multiple conditions. Type 2 diabetes is characterized by long asymptomatic periods in its early stages and in most cases remains undiagnosed for many years. Diabetes therefore sets in later. It develops faster in older people. Diabetes is associated with chronic hyperglycaemia and long term dysfunction, damage and failure of many organs [66,71]. According to Holman, 1998, the loss of insulin function begins about twelve years prior to diagnosis [91]. In addition, complications are more severe in older people than younger people. Old age may also lead to limited income and limited financial resources which may affect access to health care, choice and use of medication [92].

Always adding sugar to tea / coffee has been considered in this study as a proxy for high sugar intake. Sugar or sucrose is 50% fructose and 50% glucose. Fructose is one of the main types of sugars found in fruits such as apples, fruit juices and honey. Fructose is the active ingredient from a

high sucrose diet and has been shown in animal models as well as humans to be linked to the metabolic syndrome [93-95]. High fructose/sucrose diets do not seem to lead to excessive weight gain, except in situations where it is consumed for prolonged periods [96]. Fructose does not cause a rapid rise and subsequent large fall in blood glucose levels due to how it is metabolised [97]. Therefore, it has low glycemic load or glycemic index unlike like glucose. Recent findings indicate that dietary fructose does not stimulate both insulin and leptin secretion. Fructose consumption increases insulin resistance in rodents and humans. This has led to a suggestion that prolonged consumption of diets high in fructose could lead to increased caloric intake and contribute to weight gain and obesity [98]. An increased intake of refined carbohydrates and sucrose is associated with hypertension, obesity, diabetes, kidney disease and cardiovascular diseases in both humans and rodents [99-105].

Multivariate analysis showed markers of central obesity, namely WHR and waist circumference to be independent predictors of IFG/type 2 diabetes. Central obesity has been shown to be a better predictor for diabetes than BMI in this study and previous ones [92]. WC was associated with diabetes in univariate analysis and a borderline association in multivariate analysis was observed. WC has been shown to be positively associated to all obesity related abnormalities [106].

Obesity develops when calorie consumption is in excess of energy requirements for age, gender and physical activity level leading to accumulation of adipose tissue. Energy balance is maintained through the control of daily calorie intake and metabolism. Obesity in association with high waist circumference is an independent risk factor for diabetes and coronary heart disease. In its position statement "Standards of Medical Care in Diabetes–2010" the American Diabetes Association recommends testing for diabetes in asymptomatic people who are overweight or obese

(BMI≥25Kg/m^2) and who have one or more additional risk factors for diabetes and in those without any risk factors testing should begin at 45 years of age.

The correlation between BMI and waist circumference is high. In the elderly, fat shifts from peripheral tissues to central tissues [92]. Waist to hip ratio seems to be a better predictor of diabetes than BMI and waist circumference.

In the current study smoking was not a predictor for IFG/diabetes for former smokers as well as current smokers. This contrasts with results of the ARIC cohort study which indicated cigarette smoking as a predictor of type 2 diabetes and demonstrated that smoking cessation leads to higher short term risk of type 2 diabetes [107]. Our contrasting results might be due to the methodological differences in the assessment of smoking status and more likely due to the nature of the cross–sectional study design and anti–smoking campaigns that took place in Cameroon. Some current smokers might have falsely reported non-smoking.

In the current study a high consumption of alcohol among men and women was reported. However alcohol consumption was not associated with IFG/diabetes. This may be due to the method of assessment, self–reported alcohol consumption. The quantity of alcohol in local beers drunk by respondents was not assessed though it generally varies from 5% to 7.5%. The amount of alcoholic content in other local drinks was also not quantified.

All categories of physical activity (low, moderate and vigorous) were only practised by a small percentage of the study population. Generally, a physically active lifestyle is considered to be more favourable. A physical active lifestyle contributes to overall health, maintenance of a healthy weight,

improved daily energy levels and a general sense of well being. A sedentary lifestyle increases the risk of coronary artery disease, hypertension, type 2 diabetes, overweight, obesity, osteoporosis, certain types of cancer, anxiety, depression, decreased health related quality of life and decreased cardio respiratory, metabolic and musculoskeletal fitness [108]. We observed a borderline association between IFG/diabetes and general low physical activity and vigorous activity in contrast to studies by Helmrich et al (1991, 1994) that indicated low physical activity increases the risk of diabetes and increased physical activity prevents diabetes [109,110]. The CARDIA study also indicated that participants that were not obese at the start of the study but with low physical fitness were 3.66 times likely to develop diabetes compared with those of high fitness. In the same study increasing the fitness during the seven year study was associated with a reduced risk of diabetes [111]. In a twelve year follow up of more than 14 000 Finnish men and women, Hu et al (2003) demonstrated that physical activity at work, leisure physical activity and walking to and from work all reduced the risk of developing diabetes [112]. This contrasting result may be due to the methods used to assess physical activity, by response from participants rather than standard measure of metabolic equivalence. In Cameroon some leisure / recreational physical activities takes place in clubs and are rather social occasions. It is quite likely that many participants spent only few minutes of physical activity in the club during weekends and many more hours of socialising including alcohol and high calorie food consumption. This may offset the beneficial effects that accrue from physical activity and may help to explain the findings of the current study. Though moderate physical activity was not statistically significant participants who carry out moderate physical activity were in the current study less likely to have IFG/diabetes than those who did not. This is in line with results by Lee and Paffenbarger (2000) [113] which emphasize the benefits of moderate physical activity.

There was no statistically significant association between fruit consumption and IFG/diabetes and vegetable consumption and diabetes. Fruits and green leafy vegetables have low energy density, low

glyceamic load, and high fibre and micronutrient content and contribute to a decreased incidence of type 2 diabetes [114]. Green leafy vegetables may supply magnesium, which has been inversely linked to the development of type 2 diabetes in women [115]. A large prospective cohort of middle aged American women concluded that consumption of green leafy vegetables and fruit was associated with a lower hazard of diabetes, whereas consumption of fruit juices may be associated with an increased hazard among women [116]. Another study in Chinese women concludes that vegetable not fruit consumption may protect against the development of type 2 diabetes [117]. The lack of statistically significant association between fruit consumption and IFG and diabetes and vegetable consumption and IFG and diabetes in this study may be due to the subjective nature linked to interviewer administered questionnaire and poor quantification of the type and amounts of fruits and vegetables consumed and the seasonal availability of these produce in the local market. Vegetables are usually cooked locally with large quantities of high calorie palm oil. The effect of vegetable consumption may thus be offset by the concurrent consumption of high calorie palm oil with the vegetables. The consumption of saturated fat with vegetables was not assessed. Energy from total fat is higher in rural and urban Cameroon for all age/sex groups. Alcohol intake in the country is also high [118]. Energy intake and basal metabolic rate and the effect of foods high in meat and fat were not assessed. A multiethnic cohort concluded that foods high in meat and fat appear to confer a higher diabetes risk in all ethnic groups, whereas the effects of other dietary patterns vary by sex and ethnicity [119].

Results from lifestyle intervention trials emphasize the importance of lifestyle in the prevention of type 2 diabetes and the importance of overweight and physical inactivity in the pathogenesis of diabetes. They also demonstrate that even moderate change in lifestyle matters and changes in lifestyle also reduce the level of cardiovascular risk factors. A Swedish uncontrolled study showed that an increase in physical activity and moderate weight loss reduced the incidence of type 2 diabetes by 50% in middle–aged men with IGT [120]. A six year intervention with diet, physical

activity and diet plus physical activity showed about 30–40 % reduction in diabetes risk in both normal weight and overweight individuals in a Chinese study of IGT participants [121]. In the Finnish Diabetes Prevention Study with IGT participants where the intervention group lost weight and reduced the consumption of total fat and saturated fats and increased fibre intake more than the control group a 58% reduction of diabetes risk was observed in the intervention group. No participant in the two groups developed diabetes if they achieved four or five of the main targets of intervention [18]. Diabetes Prevention Program Trial demonstrated a 58% reduction in the risk of diabetes in the intervention group whilst the control group that was treated with metformin showed a 31% reduction in the risk of diabetes [122].

The table below compares the prevalence of some risk factors at baseline (2003) from the CAMBoD report [77, 123[5]] with the results obtained in this study after a population–based diabetes prevention programme took place in 2007.

Table 4: Some risk factors prevalence 2003[6] and 2007, Biyem Assi, Yaoundé, Cameroon

Variable	2003, N (%)	2007, N (%)
Age Group	**2 374**	**1 712**
15-24	581 (24.5)	- -
25-34	682 (28.7)	829 (48.4)
35-44	458 (19.2)	287 (16.7)
45-54	394 (16.5)	341 (19.9)
55-64	166 (6.9)	183 (10.6)
≥65	93 (3.9)	72 (4.2)
Weight status[7]		
Overweight	(30.8)	591 (34.5)
Obese	(18.6)	486 (28.4)
Daily smoking	98 (4.4)	131 (7.7)
Consumed at least one alcoholic drink in the last 12 months	(85.0)	1 088 (99.1)
Hypertension[8]	(24.0)[9]	447 (26.1)
No physical activity	(74.1)	630 (38.5)
Diabetes	100 (6.0)[10]	132 (7.7)[11], 58 (3.4%)[12]

The incidence rate per 100 persons for IFG/diabetes was 3.4 and was 4.3 for hypertension from January 2006 to June 2007 [123]. In 2003, the prevalence of IFG/diabetes amongst men was 6.3% and 5.5% amongst women. In 2007 prevalence rates were 8.5% amongst men and 7.1% amongst women for the same population. In Bamenda, Douala and Garoua in 2007 the prevalence of

[5] Project Report

[6] The prevalence includes 15-24 year age group. The values of N were not available in the final project report.

[7] Age standardized using WHO new World Population

[8] SBP≥140 & DBP≥90mmHg

[9] Age, sex and weight status adjusted

[10] Adjusted for age and weight status (normal weight, overweight, obese) when participants aged less than 25 years were excluded, assuming none of the 2003 participants less than 25 years had diabetes

[11] FCG≥6.1 mmo/l, abnormal glucose

[12] FCG≥7.0 mmol/l

IFG/diabetes amongst men was 7.3%, 7.2% and 6.7% respectively and amongst women 6.6%, 8.6% and 6.7% respectively [123]. The prevalence of IFG and diabetes (abnormal glucose) of 7.7% in the study population in 2007 is very high. The prevalence of diabetes (FCG≥7.0 mmol/l) [83] was 3.4% and is lower than the national prevalence of 4.1% in 2007 and the projected prevalence of 4.5% by 2025 but greater than the regional prevalence for Africa, which is the lowest in the world, of 3.2% (comparative prevalence 3.8%) in 2010 and the global prevalence in 2010 of 6.6% for adult population age 20–79 years, according to IDF atlas, 4th edition, 2009. The prevalence of pre diabetes (IFG) was 4.3%. The prevalence of diabetes, hypertension and obesity is a matter of concern given the considerably younger population in Cameroon. When prevalence rates using cut off of FCG≥6.1 mmol/l in 2003 and 2007 were compared, it seems that lifestyle changes to lower prevalence rates of central obesity and specifically the use of added sugar as a result of prevention programme was notsuccessful.

The population–based intervention programme was centred on surveillance, prevention and control of diabetes and hypertension. The control arm of the intervention might thus not have been very successful. This may be due to the short duration of the intervention and expansion of the health promotion programme to additional provinces and to other health facilities simultaneously addressing several programmes such as HIV/AIDS, tuberculosis, malaria, etc with limited staff.

The population targeted was dynamic with many moving in and out of the study area. The number of individuals that fully took part in the intervention from start to end was not assessed. Participants that took part in the 2007 survey received varying durations of the intervention. At the evaluation phase an effort was made to include all the participants that took part in the baseline survey but this proved difficult. All the participants included in the evaluation were resident in Biyem Assi for at least one year. When compared to the total number of information, education and communication (IEC) sessions done in other parts of the country the Biyem Assi site did the least number of sessions

in health facilities and reached out to the least number of participants [123]. The impact of these sessions was probably not yet felt by the target population. However, people who visited these places and took part in activities were not necessarily resident within the study area. Some came from far off places and neighbouring settlements. Health promotion activities targeted schools, markets, playgrounds, churches, mosques and cultural/social/njangi groups within the study site. Prevention and surveillance of diabetes and risk factors of diabetes was successful as awareness increased in the population.

4.2 STRENGTHS

One of the major strengths of this study was the use of HemoCue® B-Glucose photometer which has been validated and widely accepted to give consistent readings as compared to other instruments [80–84]. Prevalence of IFG/diabetes as defined by WHO/IDF joint report of 2006 were done and reported. In order to compare with baseline survey results of 2003 participants with FCG≥6.1mmol/l and/or on diabetes medication (insulin or oral therapy) were considered as having abnormal glucose in the analysis. In line with the WHO/IDF report (2006) further analysis using diagnosis of diabetes as FCG≥7.0mmol/l (126mg/dl) or 2–hour plasma glucose≥11.1mmol/l (200mg/dl) was also done and reported in order to compare results with current recommendations [83]. Another major strength of the current study is the use of the WHO STEPwise approach using a standardized questionnaire approved for chronic disease risk factor surveillance [4] and the training of interviewers to administer the questionnaires in a standard way.

4.3 LIMITATIONS

In considering the findings of this study it is important to bear in mind epidemiologic, technical and statistical limitations.

This study was a secondary data analysis and there was no control over the quality of data since the data was already collected. The original study was a cross–sectional study with the well–known limitations of cross–sectional studies. Interviews required finding an adult respondent at home. It is likely that under representation of working people occurred particularly for those working over time, in shifts or away from home. Interviewer administered questionnaires are susceptible to reporting (recall) bias. Questionnaire information was self – reported information, such as physical activity which was evaluated based on participants' response. Better quantifiable methods could have been used to measure the amount of fruit and vegetable consumed instead of the frequency of consumption and to evaluate consumption of other foods. The study was done in an urban setting mostly inhabited by government workers. It is possible that the observed prevalence of diabetes did not reflect the true prevalence and the risk factors may not be the same if compared with a rural setting and a mixed population and the association observed between diabetes and risk factors may be biased. Another limitation was missing observations.

The study was carried out after an intervention for the prevention of diabetes and hypertension. There might have been an over or under reporting of some lifestyle aspects that were considered by the study population as bad for health. Cameroon like most developing countries is undergoing an epidemiological transition and the results are valid for only the study population and for a limited time. BMI varies with ethnicity and the classification of participants according to weight status based on BMI may not be correct for all ethnic groups. Categorisation of variables like age, BMI, etc leads to loss of information.

The analysis used a cut off point of FCG≥6.1 mmol/l instead of FCG≥7.0 mmol/l as recommended by joint WHO/IDF technical advisory group in 2006 report. Therefore participants with IFG/diabetes were considered as having abnormal glucose for the current analysis.

4.4 CONCLUSION

The prevalence of abnormal glucose and risk factors of diabetes in Yaoundé, Cameroon in 2007 was observed to be high. Increasing age, central obesity and high sugar intake were associated with IFG and type 2 diabetes. This confirms other studies (cross sectional as well as cohort) that have shown that these variables are predictors of diabetes. Diabetes can therefore be considered becoming a public health issue in males and females of 25 years and older in the Cameroon urban population. One of the main ways to reduce the emerging IFG/diabetes pandemic is by individual lifestyle changes.

4.5 RECOMMENDATIONS

Individual life style modifications such as consumption of small or limited quantities of sugar, regular exercises to counter the effects of overweight, obesity and aging should be encouraged in order to prevent or delay the onset of abnormal glucose that is responsible for diabetes in adults aged 25 years and above.

Other studies should be done in rural as well as urban settings to determine the prevalence of IFG/diabetes and its risk factors and to assess the effects of the risk factors and their association with IFG/diabetes. Studies should also be carried out with improved methods to evaluate dietary intake (fruits and vegetable consumption and total fat intake) in order to assess the effects of high fibre, low glycaemic foods, physical activity and effectiveness of oral therapy. The interventions to change

lifestyle should be carried out for longer periods and by prospective cohort study or randomised controlled trial.

There is an urgent need to address the situation of abnormal glucose in Cameroon and other developing countries experiencing epidemiological transition. The incidence of abnormal glucose is on the rise in developing countries. IFG/type 2 diabetes can be prevented and non preventable forms of diabetes can be treated. Prevention costs are far less than treating diabetes and its complications [2]. The government and other stake holders should intensify efforts in addressing IFG/diabetes especially efforts directed at risk factor reduction and/or modification. More frontline health care personnel should be trained to handle the burgeoning pandemic of diabetes as seen in the high prevalence of IFG/diabetes complications. Proper algorithms for the management of diabetes should be developed so as to better control the glycaemia of those who are already diabetic.

ANNEX

Figures

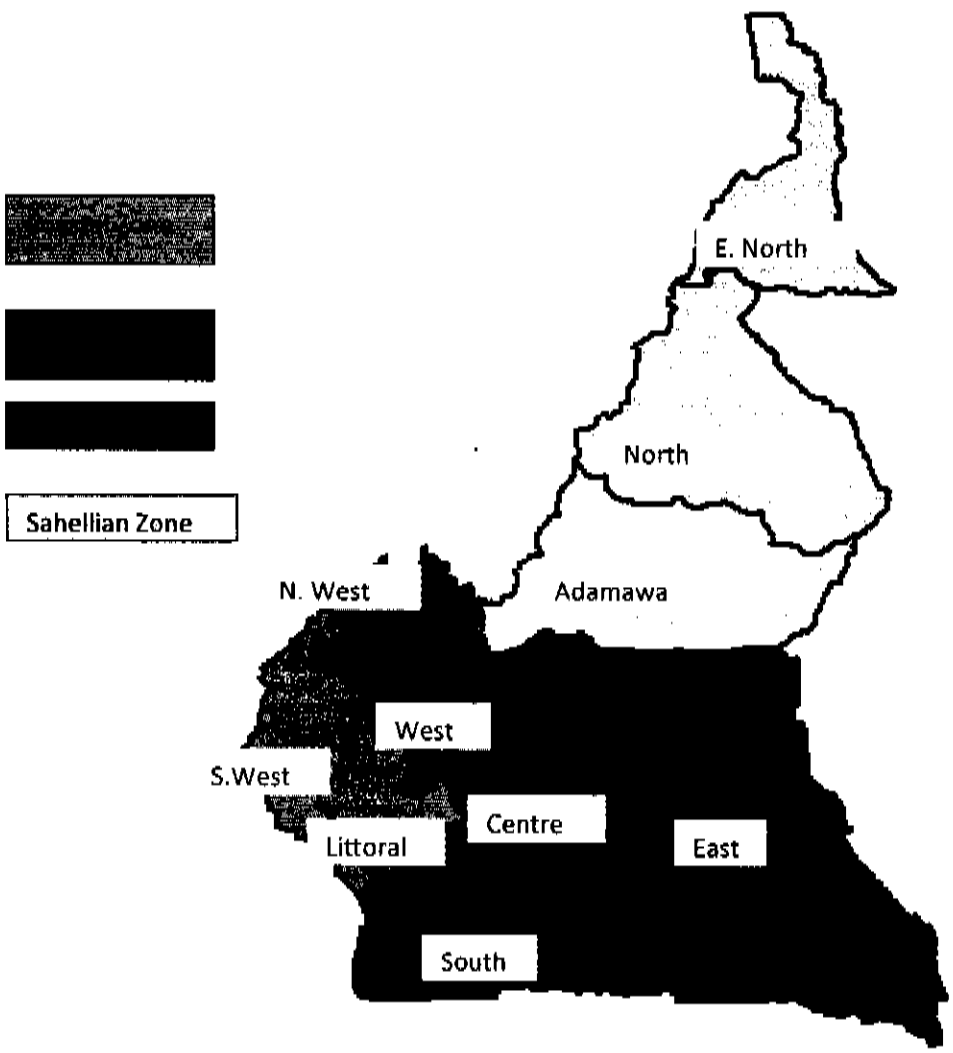


Figure 21: Cameroon map - The four ecological zones where CAMBoD project was nested

Source: CAMBoD Baseline Report

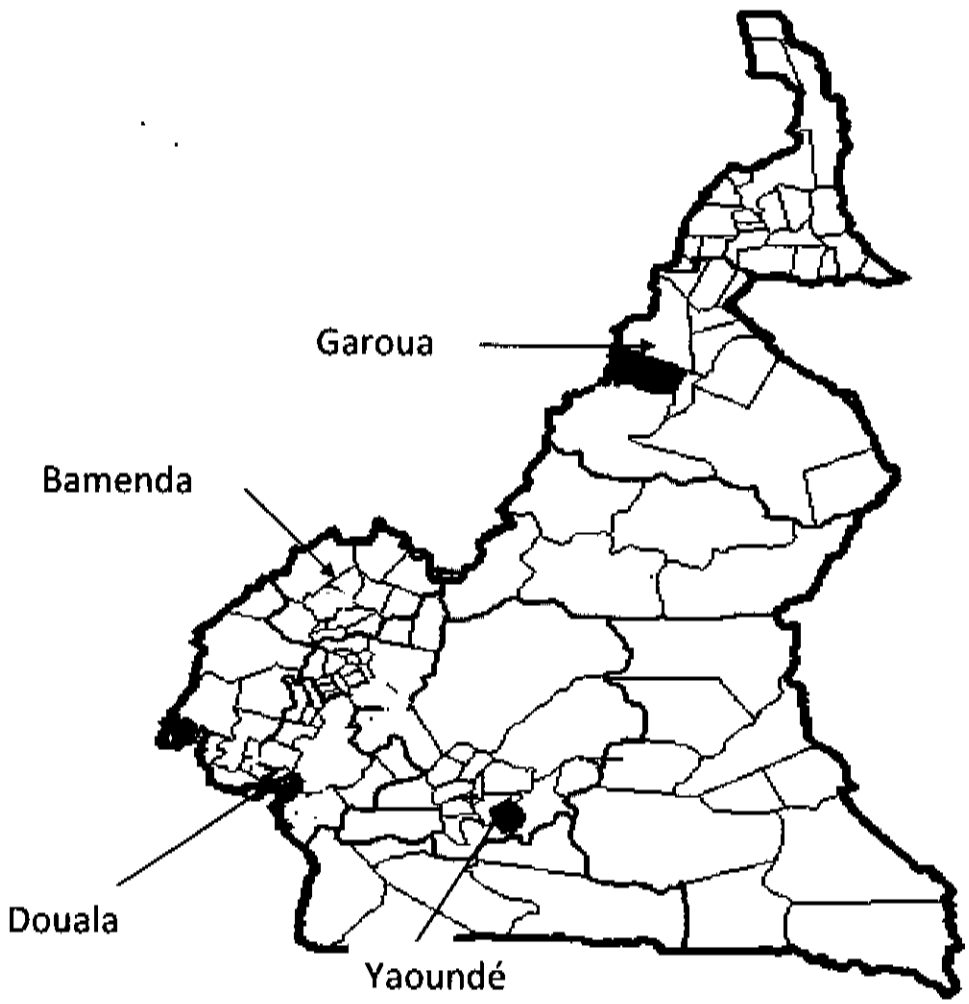


Figure 22: Yaoundé in the forest zone where Biyem Assi site is located

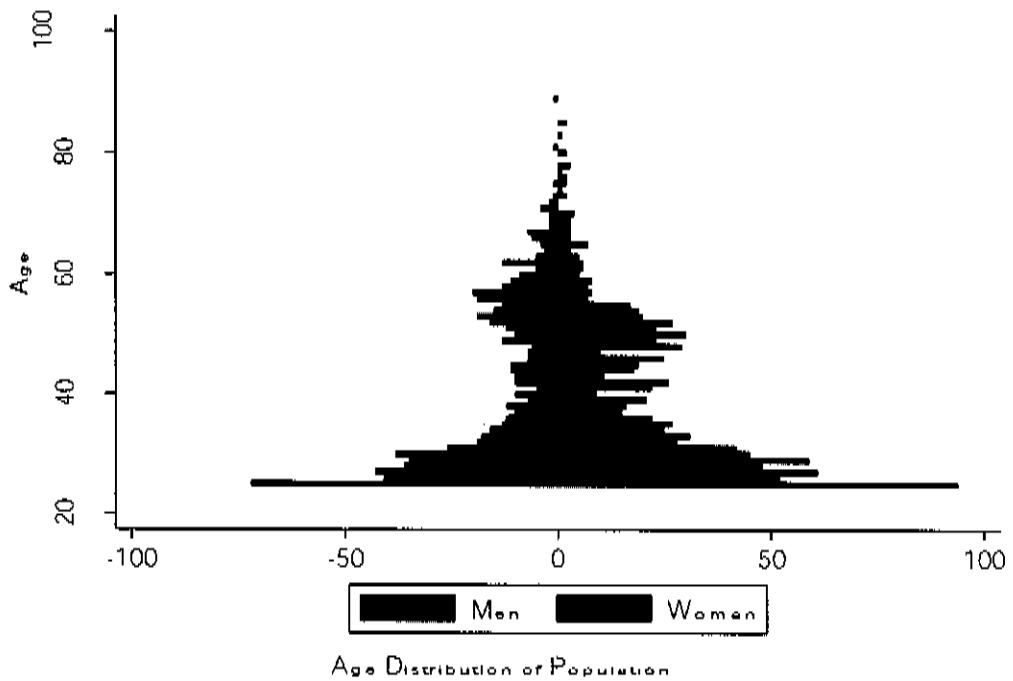


Figure 23: Population pyramid of Biyem Assi, Yaoundé, Cameroon 2007

Tables

Table 5: Prevalence of IFG/Diabetes by gender

Age Group (years)	Men		Women		Both Sexes	
	N	%	N	%	N	%
25-34	8	2.3	16	3.3	24	2.9
35-44	10	10.0	13	6.9	23	8.0
45-54	11	9.4	28	12.4	39	11.4
55-64	29	26.1	10	13.8	39	21.3
65+	2	6.0	5	12.8	7	9.7
Total	**60**	**8.5**	**72**	**7.1**	**132**	**7.7**

Table 6: Prevalence of Diabetes[13] (FCG≥7.0 mmol/l) by gender

Age Group (years)	Men		Women		Both Sexes	
	N	%	N	%	N	%
25-34	3	0.9	4	0.8	7	0.8
35-44	1	1.0	4	2.1	5	1.7
45-54	8	6.9	11	4.9	19	5.6
55-64	16	14.4	6	8.3	22	12.0
65+	2	6.1	3	7.7	5	6.9
Total	**30**	**4.3**	**28**	**2.8**	**58**	**3.4**

Table 7: Percentage of Non Diabetics[14] by gender

Age Group (years)	Men		Women		Both Sexes	
	N	%	N	%	N	%
25-34	336	97.6	469	96.7	805	97.0
35-44	90	90.0	174	93.0	264	91.9
45-54	105	90.5	197	87.5	302	88.5
55-64	82	73.8	62	86.1	144	78.6
65+	31	93.9	34	87.1	65	90.2
Total	**644**	**91.4**	**936**	**92.8**	**1 580**	**92.2**

[13] Diabetes as FCG≥7.0 mmol/l as defined by WHO/IDF report of 2006

[14] Non Diabetes participants have FCG<6.1mmol/l

Table 8: Smoking status and age group

Age group (Years)	None		Ex smokers		Current		**Total**	
	N	%	N	%	N	%	N	%
25-34	643	78.3	124	15.1	54	6.5	821	**48.4**
35-44	205	72.4	49	17.3	29	10.2	283	**16.7**
45-54	242	71.6	64	18.9	32	9.4	338	**19.9**
55-64	127	70.1	40	22.1	14	7.7	181	**10.6**
65+	59	83.1	10	14.0	2	2.8	71	**4.1**
Total	**1276**	**75.3**	**287**	**16.9**	**131**	7.7	**1 694**	**100.0**

Table 9: Male respondents by smoking status and age group

Age group (Years)	None		Ex smokers		Current		**Total**	
	N	%	N	%	N	%	N	%
25-34	206	60.7	86	25.3	47	13.8	339	**41.2**
35-44	47	47.0	30	30.0	23	23.0	100	**35.3**
45-54	42	36.2	43	37.0	31	26.7	116	**34.3**
55-64	60	54.5	36	32.7	14	12.7	110	**60.7**
65+	20	62.5	10	31.2	2	6.2	32	**45.0**
Total	**375**	**53.8**	**205**	**29.4**	**117**	**16.7**	**697**	**41.1**

Table 10: Female respondents by smoking status and age group

Age group (Years)	None		Ex smokers		Current		**Total**	
	N	%	N	%	N	%	N	%
25-34	437	90.6	38	7.8	7	1.4	482	**58.7**
35-44	158	86.3	19	10.3	6	3.2	183	**64.6**
45-54	200	90.0	21	9.4	1	0.4	222	**65.6**
55-64	67	94.3	4	5.6	0	0.0	71	**39.2**
65+	39	100.0	0	0.0	0	0.0	39	**54.9**
Total	**901**	**90.3**	**82**	**8.2**	**14**	**1.4**	**997**	**58.8**

Table 11: Drinking status and age group

Age group (Years)	None drinkers		Former drinkers		Current drinkers		**Total**	
	N	%	N	%	N	%	N	%
25-34	152	18.5	163	19.8	505	61.5	820	**48.2**
35-44	41	14.3	43	15.0	201	70.5	285	**16.7**
45-54	52	15.2	52	15.2	237	69.5	341	**20.0**
55-64	20	10.9	38	20.7	125	68.3	183	**10.7**
65+	13	18.0	13	18.0	46	63.8	72	**4.2**
Total	**228**	**16.3**	**309**	**18.1**	**1 114**	**65.4**	**1 701**	**100.0**

Table 12: Male respondents by drinking status and age group

Age group (Years)	None drinkers		Former drinkers		Current drinkers		Total	
	N	%	N	%	N	%	N	%
25-34	37	10.9	52	15.34	250	73.7	339	**41.3**
35-44	7	7.0	17	17.17	75	75.7	99	**34.7**
45-54	8	6.9	12	10.34	96	82.7	116	**34.0**
55-64	8	7.2	19	17.12	84	75.6	111	**60.6**
65+	2	6.0	4	12.12	27	81.8	33	**45.8**
Total	**62**	**8.8**	**104**	**14.90**	**532**	**76.2**	**698**	**41.0**

Table 13: Female respondents by drinking status and age group

Age group (Years)	None drinkers		Former drinkers		Current drinkers		Total	
	N	%	N	%	N	%	N	%
25-34	115	23.9	111	23.0	255	53.0	481	**58.6**
35-44	34	18.2	26	13.9	126	67.7	186	**65.2**
45-54	44	19.5	40	17.7	141	62.6	225	**65.9**
55-64	12	16.6	19	26.3	41	56.9	72	**39.3**
65+	11	28.2	9	23.0	19	48.7	39	**54.1**
Total	**216**	**21.5**	**205**	**20.4**	**582**	**58.0**	**1 003**	**58.9**

Table 14: Fruits and vegetables consumed for 1-7 days and non per week

	% Fruits 1-7 days		% Vegetables 1-7 days		0% Fruits		0% Vegetables	
Age Group	Men	Women	Men	Women	Men	Women	Men	Women
25-34	86.3	91.2	95.6	98.7	13.6	8.8	4.3	1.2
35-44	76.4	84.4	95.7	98.9	23.5	15.5	4.2	1.1
45-54	85.0	84.2	97.2	98.6	14.9	15.7	2.7	1.3
55-64	85.5	87.8	97.2	98.5	14.4	12.1	2.7	1.4
65+	88.8	83.8	96.7	97.3	11.1	16.1	3.2	2.6
Total	**86.0**	**89.1**	**96.4**	**98.7**	**13.9**	**10.8**	**3.5**	**1.2**

Table 15: Fruit Consumption by Gender and Age Group

	% 0 day		% 1-2 days		% 3-4 days		% 5-7 days		Total %	
Age Group	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
25-34	13.6	8.8	53.3	49.4	17.7	19.2	15.5	22.6	**86.3**	**91.0**
35-44	23.5	15.6	52.9	47.3	11.8	15.6	11.8	21.6	**75.6**	**85.5**
45-54	15.0	15.7	44.9	45.7	17.8	16.2	22.4	22.3	**85.3**	**80.6**
55-64	14.4	12.1	47.1	48.5	14.4	16.7	24.0	22.7	**86.6**	**88.9**
65+	11.1	16.1	59.3	35.5	11.1	25.8	18.5	22.6	**87.0**	**81.5**
Total	**15.2**	**12.1**	**51.1**	**47.7**	**16.1**	**17.9**	**17.7**	**22.4**	**41.7**	**58.3**

Table 16: Vegetable Consumption by Gender and Age Group

	% 0 day		% 1-2 days		% 3-4 days		% 5-7 days		Total %	
Age Group	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
25-34	4.4	1.3	68.0	65.6	19.3	27.8	8.4	5.4	95.7	98.8
35-44	4.3	1.1	68.1	60.8	20.2	26.0	7.4	12.1	95.7	98.9
45-54	2.7	1.4	58.2	60.4	28.2	28.6	11.0	9.7	97.4	98.7
55-64	2.8	1.4	56.9	42.3	28.4	33.8	11.9	22.6	97.2	98.7
65+	3.2	2.6	51.6	44.7	35.5	31.6	9.7	21.0	96.8	97.3
Total	**3.8**	**1.3**	**63.8**	**61.0**	**23.1**	**28.2**	**9.3**	**9.4**	**40.6**	**59.4**

Table 17: Respondents who always added sugar to tea/coffee

Age Group (years)	Men		Women		Both Sexes	
	N	%	N	%	N	%
25-34	141	41.2	166	34.3	307	37.2
35-44	25	25.0	51	27.5	76	26.6
45-54	21	18.1	34	15.1	55	16.1
55-64	16	14.4	10	13.8	26	14.2
65+	3	9.0	5	12.8	8	11.1
Total	**206**	**29.3**	**266**	**26.4**	**472**	**27.6**

Table 18: Physical Activity in Men and Women

Age group (Years)	None		Low		Moderate		Vigorous		Total	
	N	%	N	%	N	%	N	%	N	%
25-34	288	37.2	394	50.9	49	6.3	43	5.6	774	47.3
35-44	131	46.6	131	46.6	12	4.3	7	2.5	281	17.2
45-54	111	32.7	194	57.2	20	5.9	14	4.1	339	20.7
55-64	70	40.9	91	53.2	5	2.9	5	2.9	171	10.5
65+	30	42.3	37	52.1	2	2.8	2	2.8	71	4.3
Total	**630**	**38.5**	**847**	**51.8**	**88**	**5.4**	**71**	**4.3**	**1 636**	**100.0**

Table 19: Physical Activity in Men

Age group (Years)	None		Low		Moderate		Vigorous		Total	
	N	%	N	%	N	%	N	%	N	%
25-34	128	39.9	144	44.9	18	5.6	31	9.7	321	41.5
35-44	49	49.0	44	44.0	3	3.0	4	4.0	100	35.6
45-54	40	34.5	67	57.8	4	3.5	5	4.3	116	34.2
55-64	36	36.0	57	57.0	3	3.0	4	4.0	100	58.5
65+	17	51.5	14	42.4	2	6.1	0	0.0	33	46.5
Total	**270**	**40.3**	**326**	**48.7**	**30**	**4.5**	**44**	**6.6**	**670**	**41.0**

Table 20: Physical Activity in Women

Age group (Years)	None		Low		Moderate		Vigorous		Total	
	N	%	N	%	N	%	N	%	N	%
25-34	160	35.3	250	55.2	31	6.8	12	2.7	453	58.5
35-44	82	45.3	87	48.1	9	5.0	3	1.7	181	64.4
45-54	71	31.8	127	56.9	16	7.2	9	4.0	223	65.8
55-64	34	47.9	34	47.9	2	2.8	1	1.4	71	41.5
65+	13	34.2	23	60.5	0	0.0	2	5.3	38	53.5
Total	**360**	**37.3**	**521**	**53.9**	**58**	**6.0**	**27**	**2.8**	**966**	**59.0**

Table 21: Leisure activity in Men and Women

Age group (Years)	None		Low		Moderate		Vigorous		Total	
	N	%	N	%	N	%	N	%	N	%
25-34	46	5.6	699	84.5	13	1.6	69	8.3	827	48.6
35-44	17	6.0	241	84.6	9	3.2	18	6.3	285	16.8
45-54	19	5.7	292	86.9	14	4.2	11	3.3	336	19.7
55-64	10	5.5	160	87.9	7	3.9	5	2.8	182	10.7
65+	1	1.4	70	97.2	1	1.4	0	0.0	72	4.2
Total	**93**	**5.5**	**1462**	**85.9**	**44**	**2.6**	**103**	**6.1**	**1 702**	**100.0**

Table 22: Leisure activity in Men

Age group (Years)	None		Low		Moderate		Vigorous		Total	
	N	%	N	%	N	%	N	%	N	%
25-34	14	4.1	269	78.2	4	1.2	57	16.6	344	41.6
35-44	9	9.1	80	80.8	3	3.0	7	7.1	99	34.7
45-54	4	3.5	100	87.0	5	4.4	6	5.2	115	34.2
55-64	7	6.4	92	83.6	6	5.5	5	4.6	110	60.4
65+	0	0.0	32	97.0	1	3.0	0	0.0	33	45.8
Total	**34**	**4.9**	**573**	**81.7**	**19**	**2.7**	**75**	**10.7**	**701**	**41.2**

Table 23: Leisure activity in Women

Age group (Years)	None		Low		Moderate		Vigorous		Total	
	N	%	N	%	N	%	N	%	N	%
25-34	32	6.6	430	89.0	9	1.9	12	2.5	483	58.4
35-44	8	4.3	161	86.6	6	3.2	11	5.9	186	65.3
45-54	15	6.8	192	86.9	9	4.1	5	2.3	221	65.8
55-64	3	4.2	68	94.4	1	1.4	0	0.0	72	39.6
65+	1	2.6	38	97.4	0	0.0	0	0.0	39	54.2
Total	**59**	**5.9**	**889**	**88.8**	**25**	**2.5**	**28**	**2.8**	**1001**	**58.8**

Table 24: Weight Status for Both Men and Women

	Underweight (BMI<18.5)		Normal weight (18.5<BMI<24.9)		Over weight (25.0<BMI<29.9)		Obese (BMI>30.0)		Total	
Age Group (Years)	N	%	N	%	N	%	N	%	N	%
25-34	16	1.9	400	48.3	267	32.2	146	17.6	829	48.4
35-44	2	0.7	76	26.5	104	36.2	107	36.6	287	16.8
45-54	2	0.6	59	17.3	126	36.9	154	45.2	341	19.9
55-64	1	0.6	49	26.8	75	40.9	58	31.7	183	10.7
65+	1	1.4	29	40.3	19	26.4	23	31.9	72	4.2
Total	**22**	**1.3**	**613**	**35.8**	**591**	**34.5**	**486**	**28.4**	**1 712**	**100.0**

Table 25: BMI in Men

	Underweight (BMI<18.5)		Normal weight (18.5<BMI<24.9)		Over weight (25.0<BMI<29.9)		Obese (BMI>30.0)		Total	
Age Group (Years)	N	%	N	%	N	%	N	%	N	%
25-34	8	2.3	205	59.6	100	29.1	31	9.0	344	41.5
35-44	2	2.0	36	36.0	41	41.0	21	21.0	100	34.8
45-54	0	0.0	33	28.5	54	46.6	29	25.0	116	34.0
55-64	0	0.0	35	31.5	52	46.9	24	21.6	111	60.7
65+	0	0.0	16	48.5	9	27.3	8	24.2	33	45.8
Total	**10**	**1.4**	**325**	**46.2**	**256**	**36.4**	**113**	**16.1**	**704**	**41.1**

Table 26: BMI in Women

	Underweight (BMI<18.5)		Normal weight (18.5<BMI<24.9)		Over weight (25.0<BMI<29.9)		Obese (BMI>30.0)		Total	
Age Group (Years)	N	%	N	%	N	%	N	%	N	%
25-34	8	1.7	195	40.2	167	34.4	115	23.7	485	58.5
35-44	0	0.0	40	21.4	63	33.7	84	44.9	187	65.2
45-54	2	0.9	26	11.6	72	32.0	125	55.6	225	65.9
55-64	1	1.4	14	19.4	23	31.9	34	47.2	72	39.3
65+	1	2.6	13	33.3	10	25.6	15	38.5	39	54.2
Total	**12**	**1.2**	**288**	**28.6**	**335**	**33.2**	**373**	**37.0**	**1 008**	**58.9**

Table 27: Waist to hip ratio

Age group (Years)	Men				Women				**Total**			
	Less than 1.0		Greater than 1.0		Less than 0.85		Greater than 0.85		< 1.0 or <0.85		> 1.0 or >0.85	
	N	%	N	%	N	%	N	%	N	%	N	%
25-34	304	88.4	40	11.6	366	75.5	119	24.5	670	**80.8**	**159**	**19.2**
35-44	58	58.0	42	42.0	122	65.2	65	34.8	180	**62.7**	**107**	**37.3**
45-54	40	34.5	76	65.5	116	51.6	109	48.4	156	**45.8**	**185**	**54.3**
55-64	32	28.8	79	71.2	30	41.7	42	58.3	62	**33.9**	**121**	**66.1**
65+	7	21.2	26	78.8	12	30.8	27	69.2	19	**26.4**	**53**	**73.6**
Total	**441**	**62.6**	**263**	**37.4**	**646**	**64.1**	**362**	**35.9**	**1087**	**63.5**	**625**	**36.5**

Table 28: Prevalence of Hypertension

Age group (Years)	Men				Women				**Total**			
	Normal		High		Normal		High		Normal		High	
	N	%	N	%	N	%	N	%	N	%	N	%
25-34	303	88.1	41	11.9	448	92.4	37	7.6	751	**90.6**	**78**	**9.4**
35-44	79	79.0	21	21.0	161	86.1	26	13.9	240	**83.6**	**47**	**16.4**
45-54	58	50.0	58	50.0	122	54.2	103	45.8	180	**52.8**	**161**	**47.2**
55-64	48	43.3	63	56.7	29	40.3	43	59.7	77	**42.1**	**106**	**57.9**
65+	5	15.2	28	84.8	12	30.8	27	69.2	17	**23.6**	**55**	**76.4**
Total	**493**	**70.0**	**211**	**30.0**	**772**	**76.6**	**236**	**23.4**	**1 265**	**73.9**	**447**	**26.1**

Table 29: Waist circumference (WC) in men and women in centimetres

Age group (Years)	WC< 94 or 80		94≤WC <102 /80≤WC <88		WC>102 or 88		**Total**	
	N	%	N	%	N	%	N	%
25-34	513	61.9	143	17.3	173	20.9	829	**48.4**
35-44	105	36.6	52	18.1	130	45.3	287	**16.8**
45-54	86	25.2	66	19.4	189	55.4	341	**19.9**
55-64	64	35.0	48	26.2	71	38.8	183	**10.7**
65+	21	29.2	18	25.0	33	45.8	72	**4.2**
Total	**789**	**46.1**	**327**	**19.1**	**596**	**34.8**	**1712**	**100.0**

Table 30: Waist circumference in men

Age group (Years)	WC< 94cm		94 <WC <102 cm		WC>102 cm		**Total**	
	N	%	N	%	N	%	N	%
25-34	311	90.4	24	7.0	9	2.6	344	**41.5**
35-44	64	64.0	17	17.0	19	19.0	100	**34.8**
45-54	65	56.0	23	19.8	28	24.1	116	**34.0**
55-64	56	50.5	33	29.7	22	19.8	111	**60.7**
65+	17	51.5	7	21.2	9	27.3	33	**45.8**
Total	**513**	**72.9**	**104**	**14.8**	**87**	**12.4**	**704**	**41.1**

Table 31: Waist circumference in women

Age group (Years)	WC<80 cm		80 >WC <88 cm		WC>88 cm		**Total**	
	N	%	N	%	N	%	N	%
25-34	202	41.7	119	24.5	164	33.8	485	**58.5**
35-44	41	21.9	35	18.7	111	59.4	187	**65.2**
45-54	21	9.3	43	19.1	161	71.6	225	**70.0**
55-64	8	11.1	15	20.8	49	68.1	72	**39.3**
65+	4	10.3	11	28.2	24	61.5	39	**54.2**
Total	**276**	**27.4**	**223**	**22.1**	**509**	**50.5**	**1008**	**58.9**

Table 32: Level of income in men and women

Age group (Years)	Very low		Low		Average		High		**Total**	
	N	%	N	%	N	%	N	%	N	%
25-34	99	43.0	61	26.5	58	25.2	12	5.2	230	**41.4**
35-44	33	25.8	33	25.8	49	38.3	13	10.2	128	**23.0**
45-54	26	17.1	23	15.1	81	53.3	22	14.5	152	**27.3**
55-64	8	19.5	10	24.4	17	41.5	6	14.6	41	**7.4**
65+	1	20.0	1	20.0	1	20.0	2	40.0	5	**0.9**
Total	**167**	**30.0**	**128**	**23.0**	**206**	**37.1**	**55**	**9.9**	**556**	**100.0**

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APPENDIX A

HEALTH OF POPULATIONS IN TRANSITION (HoPiT)
CAMEROON BURDEN OF DIABETES (CAMBoD) Project Survey
CENSUS FORM (to be administered to the household head or senior person)

SECTION A: Identification

Household No	Street	Bloc or Quarter	Health Area	Health District	Sentinel site	Tel. No. Household Head	Informant

SECTION B: Family Data

Identification No	First Name	Other Names	Age (in years)	Sex M/F	Relation to household head	Education Level	Occupation

MESSAGE PORTE

De : SOUS-PREFET YAOUNDE VI

A : LEURS MAJESTES CHEFS TRADITIONNELS
YAOUNDE VI

N°94/MP/J06/SP du 29/05/07

MENTION : TRES URGENT

TEXTE : DANS CADRE PREPARATION ENQUETE NATIONALE SUR DIABETE ET HYPERTENSION ARTERIELLE STOP QUI COMMENCERA EN AOUT 2007 STOP UN RECENSEMENT DES POPULATIONS S'EFFECTUERA STOP DU 04 AU 18 JUIN 2007 STOP DANS DISTRICT DE SANTE DE BIYEM-ASSI STOP BIEN VOULOIR PRENDRE TOUTES DISPOSITIONS NECESSAIRES STOP EN VUE SUCCES DITE OPERATION STOP FAIRE LARGE DIFFUSION STOP EGLISES STOP MOSQUEES STOP ECOLES STOP LYCEES ET COLLEGES STOP URGENCE ET IMPORTANCE SIGNALEES STOP ET FIN./-

- ABATE EDI'I -

Vu bon à porter,

Biyem-Assi, le 30 MAY 2007

LE SOUS-PREFET

ABATE Philippe Jean
Administrateur Civil Principal

APPENDIX C

UNIVERSITY OF YAOUNDE I

Université de Yaoundé I

CAMEROON BURDEN OF DIABETES (CAMBoD) PROJECT

Health of Population in Transition, Cameroon (HoPiT) RESEARCH GROUP

0 5 JUN 2007

A Mr. et Mmes

Kpu Louis, Superviseur CAMBOD, District de Santé Cité des Palmiers, Douala.
Emmanuel Fointama, Superviseur CAMBOD, District de Santé, Garoua Urbain.
Edith Asangawa, Superviseur CAMBOD, District de Santé, Bamenda Urban.
Suh Nchang Abenwie, Superviseur CAMBOD, District Santé de Biyemassi, Yaoundé.

Suite à la lettre n° D31/L/MSP/SG/DLM/SDMNE/NMTNE/BP du 7 mai 2007 du Ministre de la Santé Publique, relative à la deuxième enquête nationale sur le diabète et l'HTA et les facteurs de risque, j'ai l'honneur de vous demander de bien vouloir rencontrer les Délégués Provinciaux de la Santé et les Chefs de Service de Santé des Districts de Santé impliqués dans cette enquête pour l'organisation des activités y relatives. Je vous rappelle que le recensement qui précède l'enquête doit commencer le 6 juin, 2007.

Vous me tiendrez informé de toutes difficultés rencontrées dans le processus.

Professeur Jean Claude Mbanya
Directeur du Projet CAMBOD

Contact: B.P. 8046 Yaoundé, Cameroon Tel.: + (237) 231.52.35 Fax: + (237) 231.52.35/231.4039

2NDE ENQUETE EN POPULATION CAMBOD - 2ND POPULATION-BASED CAMBOD STUDY *PAGE 1 OF 8*

Données d'identification du ménage / *Household Identification Information*

Enquêteur (nom et code) / *Interviewer (Name and code):* _____

☐☐

L 1	Code du site Sentinelle *Sentinel site code*	☐
L 2	Code de la zone *Zone code*	☐
L 3	Code du bloc *Block code*	☐
L 4	Code du ménage *Household code*	☐☐☐/☐☐
L 5	Date de remplissage du questionnaire *Date of completion of the questionnaire*	☐☐/☐☐ Jour/Mois *(day/month)*
L 6	Nom du chef de ménage *Name of the head of household*	

L 7	Langue de l'interview *Interview Language*	Anglais / *English* 1 Français/*French* 2 Interprète /*Translator* 3	☐
L 8	Heure de l'interview *Time of interview* (24h clock)		☐☐h☐☐
L 9	Code du sujet *Subject Code*		☐☐
L 10	Numéro de contact par téléphone *Contact phone number*	**Bureau/Office** **Domicile/Home** **Mobile/Mobile** **Autre/Other**	☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐
L 11	Boite postale du ménage (ou du lieu de travail) *PO box of the household or the office if available*		_____
L 12	Adresse électronique (e.mail address) *Email address*		_____

Afin de conserver l'anonymat des personnes qui acceptent de participer à l'étude, cette feuille doit être détachée et conservée dans un endroit sécurisé.

This sheet has to be detached and kept separately in a secure place to ensure confidentiality and anonymity of data collected.

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

Informations concernant le domicile/ *Household information*

M1a	Depuis quand habitez-vous ce site (année)? *When did you start to live here (year)?*		☐☐☐☐
M1b	Combien de personnes des tranches d'âges suivants habitent le ménage ? How many subjects of the following age range live in the household?	5 à 15 ans/*5 to 15 years* 25 ans et plus/ *25 years and above*	☐☐ ☐☐
M2	Vous êtes : *What is the tenure status?*	Locataire (paie le loyer)/*rented (normal)* 1 Locataire (paye en partie)/*Rent (subsidised)* 2 Propriétaire/*owned* 3 Maison de function (gratuite)/*Supplied free by your employer* 4 Locataire (loyer payé par autre)/*rented (paid by another person)* 5 Autre /*Other* 6 Spécifier_____	☐
M3	Si vous êtes propriétaire, comment avez-vous acquis le terrain ? *If you own the house, how did you acquire it?*	Heritage des parents/*inheritance of parents* 1 Achete/*You bought* 2 Autre/*Others* 3 Spécifier_____	☐
M4	Si vous payez, quel est le montant du loyer mensuel ? *What is the monthly cost of the rental?*		☐☐☐☐☐☐☐FCFA
M5	Type de maison: *Type of house*	Chambre/*Room* 1 Studio/*Studio* 2 Appartement/*flat* 3 Duplex/*duplex* 4 Villa/*Villa* 5 Autre/*others* 6 Specify_____	☐
M6	Matériel de construction du toit de la maison? *What is the major construction material of the roof of the house?*	Terre battue/*Mud* 1 Paille/*Thatch, straw* 2 Bois/*Wood, planks* 3 Tôle/*Iron sheets* 4 Ciment/*concrete* 5 Tuiles/*Roofing tiles* 6 Autre/*Other* 7 Spécifier_____	☐ ☐
M7	Matériel de construction des murs *What is the major construction material of the external wall of the house?*	Terre battue/*mud bricks* 1 Pierre/*Stone* 2 Briques de terre cuite/*Burnt bricks* 3 Briques de terre non cuites/*Unburn brick* 4 Ciment/*Cement* 5 Bois-bambou/*Wood-bamboo* 6 Tôles/*Iron sheets* 7 Carton/*Cardboard* 8 Paille/*Thatch, straw* 9 Autre/*others* 10 Spécifier_____	☐ ☐
M8	Matériel de construction du sol *What is the major material of the floor?*	Terre battue/*Earth* 1 Ciment/*Cement* 2 Carreaux/*Mosaic or tiles* 3 Briques/*Bricks* 4 Pierre/*Stone* 5 Bois/*Wood* 6 Autre/*other* 7 Specify_____	☐ ☐

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

M9	Répartition des pièces dans la maison *The household has how many:*	Chambres/*bedrooms* ..... Salons/*sitting rooms-parlours* ..... Cuisines modernes/*modern kitchens* ..... Cuisines traditionnelles/*traditional kitchens*..... Toilettes modernes/*modern toilets* ..... Latrines/*latrins*.....	☐ ☐ ☐ ☐ ☐ ☐
M10	Existe-t-il une barrière autour de la maison ? *Is there a fence around the house?*	Oui/*Yes* 1 Non/*No* 2	☐
M11	Quelle est la principale source d'eau à usage domestique (faire le ménage, laver le linge, etc...) *What is the Main source of domestic water (used to wash clothes, etc...)*	SNEC/*SNEC* 1 Puits protégé/*protected well* 2 Rivière-marigot/*river, stream, pond* 3 Fontaine publique/*Public taps* 4 Eau de pluie/*Rain water* 5 Puits non protégé/*unprotected well* 6 Eau de source/*Spring* 7 Forage/*bore hole* 8 Autre/*other* 9 Spécifier_____	☐ ☐
M12	Quelle est la principale source d'eau de boisson du ménage? *What is the Main source of drinking water of the household?*	SNEC/*SNEC* 1 Puits protégé/*protected well-spring* 2 Rivière-mango/*river, stream, pond* 3 Fontaine publique/*Public taps* 4 Eau de pluie/*Rain water* 5 Puits non protégé/*puits non protégé* 6 Vendor/*Tanker truck* 7 Eau de source/*Gravity flow scheme* 8 Autre/*Other*_____	☐
M13	Quelle est la principale source d'énergie pour l'éclairage du ménage ? *What is the Main fuel used for lighting of the household?*	SONEL/*SONEL* 1 Pétrole/*Kerosene* 2 Gaz/*Gas* 3 Générateur/*Generator* 4 Bougie/*Candle* 5 Feu de bois/*Firewood* 6 Autre/*other* 7 Spécifier_____	☐
M14	Quelle est la principale source d'énergie utilisée pour faire la cuisine? *What is the main source of fuel used for cooking?*	Feu de bois / *Firewood* 1 Charbon/*Charcoal* 2 Pétrole / *Kerosene-oil* 3 Gaz / *Gas* 4 Electricité / *Electricity* 5 Sciure-copeaux/*Crop residue-saw dust* 6 Déchets d'animaux/*Animal waste* 7 Autre/*Other* 8 Spécifier_____	☐
M15	Avez-vous internet à la maison ? *Do you have internet at home?*	Oui/*Yes* 1 Non/*No* 2	☐
M16	Quel est votre revenu annuel ? (FCFA) *How much money do you earn per year (CFA F)?*		☐☐☐☐☐☐☐☐☐☐
M17	Quel est le revenu annuel de votre conjoint ? (FCFA) *How much money does your partner earn per year?*		☐☐☐☐☐☐☐☐☐☐
M18	Quel est le revenu annuel du ménage ? (FCFA) *How much money does the household earn per year (CFA F)?*		☐☐☐☐☐☐☐☐☐☐

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

M19	Desquelles des facilités suivantes disposent la maison ? *Which of the following facilities is owned by the household?*		Ecrire un nombre *Write a number*	
	Congélateur/*Freezer*.....	☐	Cuisinière à gaz/*Gas stove*...	☐
	Vélo/*bicycle*.....	☐	Cuisinière électrique/*Electric stove*.....	☐
	Moto/*motocycle*.....	☐	Micro-onde/*micro-wave oven*.....	☐
	Salle à manger/*Dining room*	☐	Climatiseur/*air conditionner*.....	☐
	Salon/*Sitting room*.....	☐	Téléphone ordinaire/*fix telephone*.....	☐
	Fer à repasser électrique/*electric iron* .	☐	Poste de télévision/*TV set*.....	☐
	Fer à repasser à charbon/*chacoal iron*	☐	Ordinateur de bureau/*desktop computer*..	☐
	Domestique/*House servant*	☐	Ordinateur portable/*laptop computer*.....	☐
	Gardien/*Night watchman*	☐	Machine à laver/*Laundry machine*	☐
	Voitures/*cars or trucks*.....	☐	Réfrigérateur/*Refrigerator*	☐
	Machine à coudre/*sewing machine*....	☐		

Sujets de plus de 25 ans habitant le ménage/*Subjects aged 25 years and above, living in the household*

	PARTICIPANT 1 / *PARTICIPANT 1*		
B1	Nom de famille *Family name*	_____	
B2	Prénom *First name*	_____	
B3	Code du sujet *Subject code*		☐☐
B4	Age (Années) *Age (Years)*		☐☐
B5	Sexe *Sex*	Homme/*male* 1 Femme/*female* 2	☐
B6	Date de la mesure de la glycémie *Date of blood glucose measurement*	☐☐/☐☐ Jour/Mois *(day/month)*	
B7	Heure du dernier repas la veille *Time of the last meal*	☐☐h☐☐	
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*	☐☐h☐☐	
B9	Glycémie à jeun *Fasting blood glucose*	☐☐.☐ mmol/l	

	PARTICIPANT 2 / *PARTICIPANT 2*		
B1	Nom de famille *Family name*		
B2	Prénom *First name*		
B3	Code du sujet *Subject code*		☐☐
B4	Age(années) *Age (years)*		☐☐
B5	Sexe *Sex*	Homme/*male* 1 Femme/*female* 2	☐
B6	Date de la mesure de la glycémie *Date of blood glucose measurement*		☐☐/☐☐ Jour/Mois *(day/month)*
B7	Heure du dernier repas la veille *Time of the last meal*		☐☐h☐☐
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*		☐☐h☐☐
B9	Glycémie à jeun *Fasting blood glucose*		☐☐.☐ mmol/l

	PARTICIPANT 3 / *PARTICIPANT 3*		
B1	Nom de famille *Family name*		
B2	Prénom *First name*		
B3	Code du sujet *Subject code*		☐☐
B4	Age(années) *Age (years)*		☐☐
B5	Sexe Sex	Homme/*male* 1 Femme/*female* 2	☐
B6	Date de la mesure de la glycémie *Date of blood glucose measurement*		☐☐/☐☐ Jour/Mois *(day/month)*
B7	Heure du dernier repas la veille *Time of the last meal*		☐☐h☐☐
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*		☐☐h☐☐
B9	Glycémie à jeun *Fasting blood glucose*		☐☐.☐ mmol/l

	PARTICIPANT 4 / *PARTICIPANT 4*		
B1	Nom de famille *Family name*		
B2	Prénom *First name*		
B3	Code du sujet *Subject code*		☐☐
B4	Age(années) *Age (years)*		☐☐
B5	Sexe Sex	Homme/*male* 1 Femme/*female* 2	☐
B6	Date de la mesure de la glycémie *Date of blood glucose measurement*		☐☐/☐☐ Jour/Mois *(day/month)*
B7	Heure du dernier repas la veille *Time of the last meal*		☐☐h☐☐
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*		☐☐h☐☐
B9	Glycémie à jeun *Fasting blood glucose*		☐☐.☐ mmol/l

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

	PARTICIPANT 5 / *PARTICIPANT 5*	
B1	Nom de famille *family name*	
B2	Prénom *First name*	
B3	Code du sujet Subject code	☐☐
B4	Age(années) *Age (years)*	☐☐
B5	Sexe *Sex*	Homme/*male* 1 Femme/*female* 2 ☐
B6	Date de la mesure de la glycémie *Date of blood glucose measurement*	☐☐/☐☐ Jour/Mois *(day/month)*
B7	Heure du dernier repas la veille *Time of the last meal*	☐☐h☐☐
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*	☐☐h☐☐
B9	Glycémie à jeun *Fasting blood glucose*	☐☐.☐ mmol/l

	PARTICIPANT 6 / PARTICIPANT 6	
B1	Nom de famille *Family name*	
B2	Prénom *First name*	
B3	Code du sujet *Subject code*	☐☐
B4	Age(années) *Age (years)*	☐☐
B5	Sexe *Sex*	Homme/*male* 1 Femme/*female* 2 ☐
B6'	Date de la mesure de la glycémie *Date of blood glucose measurement*	☐☐/☐☐ Jour/Mois (*day/month*)
B7	Heure du dernier repas la veille. *Time of the last meal*	☐☐h☐☐
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*	☐☐h☐☐
B9	Glycémie à jeun *Fasting blood glucose*	☐☐.☐ mmol/l

	PARTICIPANT 7 / *PARTICIPANT 7*	
B1	Nom de famille *Family name*	
B2	Prénom *First name*	
B3	Code du sujet Subject code	☐☐
B4	Age(années) *Age (years)*	☐☐
B5	Sexe *Sex*	Homme/*male* 1 Femme/*female* 2 ☐
B6	Date de la mesure de la glycémie *Date of blood glucose measurement*	☐☐/☐☐ Jour/Mois (day/month)
B7	Heure du dernier repas la veille *Time of the last meal*	☐☐h☐☐
B8	Heure à laquelle la glycémie est mesurée *Hour of blood glucose measurement*	☐☐h☐☐
B9	Glycémie à jeun *Fasting blood glucose*	☐☐.☐ mmol/l

Fiche de récapitulative des foyers

Effectif: Total : |__|__| 5-15 ans: |__|__| 25 ans et plus : |__|__|

No	Nom et Prénoms	Age (Année)	Interviewé (Oui/Non)	Glycémie (Oui/Non)	Observations (si refus, raisons)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

PROJET CAMEROON BURDEN OF DIABETES (CAMBoD)

FQ?

DEUXIEME ENQUETE EN POPULATION

QUESTIONNAIRE POUR ADULTES (25 ANS ET PLUS)

[1]Formulaire de consentement éclairé

Bonjour Madame, Mademoiselle, Monsieur,

Nous travaillons pour le projet CAMBoD (Cameroon Burden of Diabetes). Ce projet est conduit en relation avec le Ministère de la Santé Publique. Le but de ce projet est de mettre sur pied un programme de suivi, de prévention et de contrôle du diabète sucré et de l'hypertension artérielle au Cameroun. Pour ce faire, nous avons besoin de collecter des informations en ce qui concerne chaque individu et de pratiquer des examens qui nous aiderons à planifier et à réaliser le projet. Avec votre permission, nous aimerions poser à vous et à certains membres de votre famille quelques questions relatives à votre état de santé, votre niveau socio-économique et votre mode de vie. Nous aurons également à réaliser des examens complémentaires, dont certains nécessiteront un prélèvement de sang, afin de connaître votre état de santé par rapport à l'hypertension artérielle, au diabète et à leurs facteurs de risque. Aujourd'hui, nous commencerons par vous poser des questions et nous mesurerons votre poids, votre taille, d'autres paramètres anthropométriques et votre pression artérielle. Parce que la glycémie (taux de sucre dans le sang), pour être interprétable, doit être réalisée à jeun, un membre de l'équipe passera chez vous demain matin ou une autre matinée à votre convenance pour réaliser cet examen. Si les investigations que nous allons mener révèlent que vous avez ou êtes sur le point d'avoir l'hypertension artérielle ou le diabète, nous vous en informerons et vous serez alors référé vers un hôpital pour un traitement et une prise en charge appropriée. Tous les examens cliniques et biologiques que vous accepterez de réaliser seront gratuits. Vous êtes libre de choisir de participer ou de ne pas participer à cette étude. Choisir de participer vous sera avantageux pour trois principales raisons :

1. Vous saurez si oui ou non vous avez l'hypertension artérielle ou le diabète.
2. Vous saurez si oui ou non, vous êtes à risque de developper l'une quelconque ou ces deux maladies.
3. Connaître votre statut (hypertendu ou diabétique) vous aidera à prendre des mesures appropriées concernant votre santé. Ces mesures permettront au mieux de prévenir les complications de ces maladies.

De plus, si vous en avez envie à n'importe quel moment, vous pouvez mettre fin à l'interview ou aux examens qui sont réalisés, sans aucune contrepartie et sans avoir à vous justifier. Nous vous assurons que toutes les informations que vous nous communiquerez, y compris les résultats d'examens, seront traitées dans la stricte confidentialité. Pour cette raison, il est crucial que les informations que vous allez nous communiquer soient des plus correctes et véridiques que possibles.

Choisissez-vous librement de participer à cette enquête ?

OUI ☐ Continuer
NON ☐ Arrêter

Noms et signature _____

Date: |__|__/__|__| 2007 (JJ/MM/2007)

[1] **D'après la loi No. 91/023 de Décembre 1991, les informations résultantes des enquêtes et les données des recensements sont strictement confidentiels et ne peuvent, de ce fait, être utilisées de façon récriminatoire.**

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

CAMEROON BURDEN OF DIABETES (CAMBoD) PROJECT

SECOND POPULATION BASED SURVEY

ADULTS QUESTIONNAIRE

[2]Informed Consent form

Good day Sir/Madame/Ms

We are working for the Cameroon Burden of Diabetes (CAMBoD) project. This project is implemented in collaboration with the Ministry of Public Health. The goal of this project is to put in place a program to monitor, prevent and control diabetes mellitus and High Blood pressure in Cameroon. To do this we need to collect information concerning each individual and to carry out some examinations which will help us to plan and execute this project. With your permission we will like to ask you some questions in connection with your state of health, your socioeconomic level and your mode of life. We will equally do examinations, some of which may need you to provide a blood sample, in order to know your state of health in relation to high blood pressure, diabetes and their risk factors. Today, we shall start by asking you and some members of your household some questions, and then we shall measure your weight, your height, other anthropometric measures and your blood pressure. Because glycemia (sugar in the blood), can only be interpreted when measured fasting, a member of the team will pass in your house tomorrow morning or at your convenience to carryout the test. If the investigations we are going to do reveal that you have or you are about to have high blood pressure or diabetes, we shall inform you of it and you shall be referred to the hospital for treatment and appropriate management. All clinical and laboratory examinations which you accept to do will be free of charge. You are free to choose to participate or not in this study. Choosing to participate will be advantageous to you for three major reasons:

1. You will know whether or not you have high blood pressure or diabetes mellitus;
2. you will know whether or not you are at risk of having one of these two diseases;
3. To know your status (hypertensive or diabetic) will help you take appropriate measures concerning your health status. These measures will best ensure the prevention of complications of these two diseases.

Furthermore, if you so desire at any moment, you can put an end to the interview or to the examinations which have been carried out without payment and without having to justify yourself. We assure you that all the information you will give us including the results of the tests, shall be treated with utmost confidentiality. It is crucial for this reason that the information you are going to release to us be as correct and as true as possible.

Do you freely choose to participate in this survey?

YES ☐ Continue

NO ☐ End

Name and signature:

_____

Date: |__|__|/__|__| 2007 (DD/MM/2007)

2According to law No 91/023 of December 1991, information resulting from surveys and data from censuses are strictly confidential and cannot, for this reason be used in a recriminatory manna.

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

Données d'identification / *Identification Information* (SECTION I)

Enquêteur (nom et code) / *Interviewer (Name and code)*: _____ ☐☐

I 1	Code du site Sentinelle *Sentinel site code*	Douala = P Garoua = G Bamenda = B Yaoundé = Y	☐
I 2	Code de la zone *Zone code*	Chiffre de 1 à 9 Number from 1 to 9	☐
I 3	Code du bloc *Block code*	Lettre de A à H Letter from A to H	☐
I 4	Code du ménage *Household code*		☐☐☐/☐☐
I 5	Date de remplissage du questionnaire *Date of completion of the questionnaire*		☐☐/☐☐ Jour/Mois (day/month)
I 6	Nom du chef de ménage *Name of the head of household*		
I 7	Code du chef de ménage *Head of household code*		☐☐

I 8	Langue de l'interview *Interview Language*	Anglais / *English* 1 Français/*French* 2 Interprète /*Translator* 3	☐
I 9	Heure de début de l'interview (échelle de 24h) *Time of the beginning of the interview* (24h clock)		☐☐h☐☐
I 10	Nom de famille du répondant *Family Name of the respondent*		
I 11	Prénom du répondant *First Name of the respondent*		
I 12	Code du sujet *Subject Code*	Numéro de 01 à 99 attribué à chaque adulte du ménage Number from 00 to 99 attributed to each subject in the household	☐☐
I 13	Numéro de téléphone *Phone number*	**Bureau/Office** **Domicile/Home** **Mobile/Mobile** **Autre/Other**	☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐ ☐☐☐☐☐☐☐☐
I 14	Adresse électronique (courriel) *E.mail address*		
I 15	Boite postale du domicile ou lieu de travail (si disponible) *PO box of the household or of office if available*	1._____ 2._____	

Afin de conserver l'anonymat des personnes qui acceptent de participer à l'étude, cette feuille doit être détachée et conservée dans un endroit sécurisé

This sheet has to be kept separately in a secure place to ensure confidentiality and anonimity of data collected.

Informations démographiques / Demographic data (Section D)

D1	Sexe (noter ce que vous voyez) Sex (record as observed)	Homme / *Male* 1 Femme / *Female* 2	☐
D2	Quelle est votre date de naissance? *What is your date of birth?* Ne sait pas/don't know = 99 ou/or 9999	☐☐ / ☐☐ / ☐☐☐☐ Jour/day Mois/month Année/year	
D3	Quel âge avez-vous? *How old are you?*	Années /*Years* Ne sait pas / *Don't know* = 99	☐☐
D4	Quel est votre statut Matrimonial ? *What is your marital status?*	Marié / *Married* 1 Célibataire / *Single* 2 Divorcé / *Divorced* 3 Veuve-veuf *Widow-widower* 4 Séparé / *Separated* 5 *Veuve remariée/widow remarried* 6 *Divorcé remarié/divorced remarried* 7 *Concubinage/Cohabitating* 8	☐
D 5	Quel est votre province d'origine ? *What is your province of origin?*	Centre / *Centre* 1 Sud / *South* 2 Est / *East* 3 Littoral / *Littoral* 4 Sud Ouest / *South West* 5 Nord Ouest / *North West* 6 Ouest / *West* 7 Adamaoua / *Adamaoua* 8 Nord / *North* 9 Extrême Nord / *Far North* 10	☐☐

DONNEES démographiques élargies / *EXPANDED - Demographic information*

D 6	En tout, combien d'années avez-vous passé à l'école ou à suivre une formation à plein temps? *In total, how many years have you spent at school or in full-time study including apprenticeship?*			☐☐
D 7	Quel est votre niveau de scolarisation le plus élevé ? *What is the highest level of education you have completed?*	Jamais fréquenté / *No formal schooling* Moins du primaire / *Less than primary school* Primaire / *Primary school completed* Secondaire (6e – 3e) / *Secondary school completed* Secondaire (2nde - Tle) / *High school) completed* Universitaire / *University completed* Doctorat / *Post graduate degree completed* Autre/Other If other, specify	1 2 3 4 5 6 7 8	☐
D 8	Quel est le niveau de scolarisation le plus élevé de votre père ? *What is your father's highest level of education?*	Jamais fréquenté / *No formal schooling* Moins du primaire / *Less than primary school* Primaire / *Primary school completed* Secondaire (6e – 3e) / *Secondary school completed* Secondaire (2nde - Tle) / *High school) completed* Universitaire / *University completed* Doctorat / *Post graduate degree completed* Ne sait pas/Don't know If other, specify	1 2 3 4 5 6 7 9	☐

D 9	Quel est le niveau de scolarisation le plus élevé de votre mère? *What is your mother's highest level of education?*	Jamais fréquenté / *No formal schooling*	1	☐
		Moins du primaire / *Less than primary school*	2	
		Primaire / *Primary school completed*	3	
		Secondaire (6e – 3e) / *Secondary school completed*	4	
		Secondaire (2nde - Tle) / *High school) completed*	5	
		Universitaire / *University completed*	6	
		Doctorat / *Post graduate degree completed*	7	
		Ne sait pas/Don't know.....	9	
		If other, specify_____		

D 10	Quel est votre profession ? *What is your occupation ?*	_____
D 11	Quelle est la profession de votre père ? *What is your father's occupation?*	_____
D 12	Quelle est la profession de votre mère ? *What is your mother's occupation?*	_____

D 13	Quel était votre statut de travail pendant les 12 derniers mois ? Au plus 2 réponses sont possibles *Which of the following best describes your main work status over the last 12 months?Maximum 2 responses are allowed*	Fonctionnaire / *Civil servant* 1	☐
		Employé du secteur privé / *Private sector employee* 2	
		Auto emploi / *Self-employed* 3	
		Emploi non rémunéré (cultivateur etc.)/*Non-paid (subsistence farming etc)* 4	☐
		Etudiant / *Student* 5	
		ménagère (domestique) / *House keeper (household chores)* 6	☐
		Retraité / *Retired* 7	
		Sans emploi (capable de travailler) / *Unemployed (able to work)* 8	
		Sans emploi (incapable de travailler) / *Unemployed (unable to work)* 9	
		*If Other, specify*_____	

D 14	Travaillez-vous actuellement? *Do you currently work?*	**Si NON, aller à D16** **If NO, go to D16**	Oui/Yes 1 Non/No 2	☐
D 15a	Quel est votre horaire de travail? *What are your working hours?*	Journée normale/Normal working hours 1 Journée continue/Continuous day 2 3x8/3x8 3 Nuit/Night 4 Partiel ou mi-temps/Part time 5 Sans horaire fixe/ Not fix working hours 6 Occasionnel/Works occasionally 7 2x12/2x12 8 Autre/Other 9 Specifier _____		☐
D 15b	Quel est votre revenu annuel ? (FCFA) How much money do you earn per year (CFA F)?	☐☐☐☐☐☐☐☐☐		
D 16	Combien avez-vous d'enfants vivants? *How many living children do you have?*	**Si Pas d'enfant vivant, aller à D 18** **If NO child alive, go to D 18**		☐☐
D 17	Combien de vos enfants âgés entre 5 et 15 ans vivent avec vous dans cette maison? *How many of your children aged between 5 and 15 years live in this house with you?*			☐☐
D 18	Avez-vous l'intention de quitter cette maison pour aller vivre ailleurs au cours des 2 prochaines années? Do you plan to leave this house to live somewhere else in the next 2 years?	Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3		☐

D 19a	En moyenne, combien d'heures de sommeil avez-vous par nuit? *On average, how many hours do you sleep per night?*	En semaine/Week days Le week-end/Week-ends	☐☐h☐☐ ☐☐h☐☐
D 19b	Avez-vous des problèmes de sommeil ? *Do you have sleep disorders?*	Si NON, aller à D21 If NO, go to D21	Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
D 20	Si oui, quels problèmes de sommeil avez-vous ? *If yes, which sleep disorders do you have?*	Des insomnies /Insomnia 1 Des Ronflements pendant la nuit/Snorings during sleep 2 Autre/Other 3 Specifier	☐
D 21	Faites-vous des siestes dans la journée? *Do you have siesta during the day?*	Si NON, aller à D23 If NO, go to D23	Oui/Yes 1 Non/no 2 ☐
D 22a	Combien de jours par semaine faites-vous la sieste? *How many days per week do you have a siesta?*		☐
D 22b	Combien de minutes en moyenne dure une sieste? *Usually, how long (in minutes) is your siesta?*		☐☐☐ min
D 23	En moyenne, combien d'heures par semaine lisez-vous en dehors de votre travail ou de vos études? *On average, how many hours per week do you read, excluding for your work or study?*		☐☐h☐☐
D 24	En moyenne, combien d'heures par jour regardez-vous la television/les films? *On average, how many hours per day do you watch TV/movies?*	En semaine/Weeks days Le week-end/Weekends	☐☐h☐☐ ☐☐h☐☐

Cette section concerne les FEMMES UNIQUEMENT
This section is for WOMEN ONLY

D 25	A quel âge avez-vous eu vos règles pour la première fois (années) ? *How old were you when you had your first menstruation (in years)?*		☐☐
D 26	Avez-vous pris au cours des 12 derniers mois un traitement hormonal pour régulariser vos règles ou une pilule contraceptive? *Over the last 12 months, have you taken any oral contraceptive pills?*	Si NON, aller à D29a If NO, go to D29a	Oui/Yes 1 Non/No 2 Oui, mais dans le passé 3 Ne sait pas/Don't know 4 ☐
D 27	Si oui, quel est le nom de cette pilule? *If yes, which one?*		_____
D 28	Si oui, depuis combien de mois ou pendant combien de mois ? *If yes, since how many months, or for how many months?*		☐☐☐
D 29a	Etes-vous enceinte? *Are you pregnant?*		Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
D 29b	Quelle est la date de vos dernières règles ? What is the date of your last menses?		☐☐/☐☐ Jour/Mois (day/month)
D 30	Etes-vous menopausée? *Have you reached menopause?*	Si NON, aller à Section $ If NO, go to Section $	Oui/Yes 1 Non/no 2 Ne sait pas/Don't know 3 ☐
D 31	Si oui, à quel âge avez-vous été menopausée? *If yes, how old were you when you stopped menstruating?*		Age en années Age in years ☐☐
D 32	Prenez-vous un traitement hormonal en rapport avec la menopause? *Do you take hormonal treatment for menopause?*	Si NON, aller à S1a If NO, go to S 1a	Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
D 33	Si oui, quelle est la voie d'administration de ce traitement ? *If yes, how is this treatment administered?*		Comprimés/tablets 1 Gel/cream 2 Patch/patches 3 ☐

Etape 1 / Step 1 Données comportementales / *Core Behavioural Measures*

Consommation de tabac / *Tobacco use* (Section S)

Nous allons maintenant vous poser quelques questions concernant certaines habitudes de vie, comme fumer, boire de l'alcool, consommer des fruits et légumes, et effectuer une activité physique. Commençons par le tabac.

Now we are going to ask some questions about various health behaviours. This includes things like smoking, drinking alcohol, eating fruits and vegetables and physical activity. Let's start with smoking.

S 1a	Avez-vous déjà fumé, que ce soit la cigarette, le cigare, ou la pipe ? *Have you ever smoked any **tobacco products**, such as cigarettes, cigars or pipes?*	Oui / *Yes* 1 Non / *No* 2	***Si non, aller à*** ***If No, go to*** S 6a	☐
S 1b	**Si Oui / *If Yes,*** Fumez-vous actuellement, que ce soit la cigarette, le cigare, ou la pipe ? *Do you currently smoke any **tobacco products**, such as cigarettes, cigars or pipes?*	Oui / *Yes* 1 Non / *No* 2	***Si non, aller à S4*** ***If No, go to S4***	☐
S 1c	**Si Oui / *If Yes,*** Est-ce que vous fumez actuellement **tous les jours**? *Do you currently smoke tobacco products **daily**?*	Oui / *Yes* 1 Non / *No* 2	***Si non, aller à*** ***If No, go to*** S 3a	☐
S 2	A quel âge avez-vous **commencé à fumer** quotidiennement? *How old were you when you **first started** smoking daily?*		Age en années Age in years	☐☐
S 2a	En moyenne, **quelle quantité** des produits suivants fumez-vous par jour? (CODE 99 POUR "NE SAIT PAS" ET 77 POUR "REFUSE") *On average, **how many** of the following do you smoke each day?* *(CODE 99 FOR DON'T KNOW AND 77 FOR REFUSED*	Cigarettes industrielles / *Manufactured cigarettes*..... Cigarettes roulées (batons) / *Hand-rolled cigarettes* ..... Pipes pleines (fois) / *Pipes full of tobacco*..... Cigares, (battons) / *Cigars*,.....		☐☐ ☐☐ ☐☐ ☐☐
S 3a	Avez-vous déjà essayé d'arrêter de fumer, mais sans succès? Have you ever tried to stop smoking, but couldn't?		Oui / *Yes* 1 Non / *No* 2	☐
S 3b	Est-ce que vous fumez toujours parce que c'est trop difficile d'arrêter? Do you still smoke because it is really hard to quit?		Oui / *Yes* 1 Non / *No* 2	☐
S 3c	Avez-vous déjà ressenti que vous étiez dépendant du tabac? Have you ever felt like you were addicted to tobacco?		Oui / *Yes* 1 Non / *No* 2	☐
S 3d	Avez-vous parfois de fortes envies de fumer? Do you ever have strong cravings to smoke?		Oui / *Yes* 1 Non / *No* 2	☐
S 3e	Avez-vous déjà ressenti que vous aviez vraiment besoin d'une cigarette? Have you ever felt like you were really in need of a cigarette?		Oui / *Yes* 1 Non / *No* 2	☐
S 3f	Est-ce que c'est difficile pour vous de ne pas fumer dans les endroits où c'est interdit, comme dans les écoles? Is it hard to keep from smoking in places where you are not supposed to (eg in church or school)?		Oui / *Yes* 1 Non / *No* 2	☐
Quand vous avez essayé d'arrêter de fumer... (ou quand vous n'avez pas fumé pendant un certain temps...) **(S3g à S3j)** When you haven't used tobacco for a while ... OR When you tried to stop smoking ... **(S3g to S3j)**				
S 3g	Avez-vous trouvé difficile de vous concentrer par ce que vous ne pouviez pas fumer? Did you find it hard to concentrate because you couldn't smoke?		Oui / *Yes* 1 Non / *No* 2	☐
S 3h	Vous sentiez-vous plus irritable parce que vous ne pouviez pas fumer? Did you feel more irritable because you couldn't smoke?		Oui / *Yes* 1 Non / *No* 2	☐
S 3i	Avez-vous ressenti une forte envie de fumer? Did you feel a strong need or urge to smoke?		Oui / *Yes* 1 Non / *No* 2	☐

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S 3j	Vous sentiez-vous nerveux, hyperactif ou anxieux parce que vous ne pouviez pas fumer? Did you feel nervous, restless or anxious because you couldn't smoke?	Oui / Yes 1 Non / No 2	☐
S3k	Qu'est ce qui pourrait vous faire arrêter de fumer ? What/Who could make you stop smoking?	_____	

Consommation de tabac Elargie / *EXPANDED : Tobacco Use*

Les questions S4 à S5c concernent uniquement les ex-fumeurs.
Questions S4 to S5c are only for EX smokers.

S 4	Est-ce que vous avez fumé quotidiennement dans le passé ? *In the past, did you ever smoke daily?*	Oui / Yes 1 Non / No 2	Si non, aller à / If No go to S6a	☐
S5a	Si oui/If yes Quel âge aviez-vous lorsque vous avez commencé à fumer quotidiennement? *How old were you when you started smoking daily?*	Age en années Age in years		☐☐
S 5b	Si Oui/If yes Quel âge aviez-vous lorsque vous avez arrêté de fumer quotidiennement ? *How old were you when you stopped smoking daily?*	Age en années Age in years		☐☐
S 5c	Pourquoi avez-vous arrêté de fumer quotidiennement? *Why did you stop smoking daily?*	Problème de santé/Health problem 1 Désir personnel/Because I wanted to stop 2 Désir de l'entourage/Because of my friends/family 3 Problèmes financiers/Financial problems 4 Autre/Other 5 Specifier_____		☐
S 6a	Prenez-vous actuellement, d'autres tabacs non fumés comme la prise, tabac mâché ? *Do you currently use any smokeless tobacco such as snuff, chewing tobacco?*	Oui / Yes 1 Non / No 2	Si non, aller a / If No go to S7	☐
S 6b	Si Oui / If Yes, Est ce que vous les prenez quotidiennement ? *Do you currently use smokeless tobacco products daily?*	Oui / Yes 1 Non / No 2		☐
S 7	Vivez-vous actuellement régulièrement au contact direct d'un fumeur ? *Are you currently regularly exposed to other people smoking?*	Si non, aller à / If No go to Section A	Oui / Yes 1 Non / No 2	☐
S 7a	Si Oui, / If Yes Avec quelle fréquence, au cours d'une semaine normale, êtes-vous exposé à la fumée des autres dans les lieux suivants : How often in a typical week are you exposed to other people smoking in each of the following locations?	Chaque jour/Every day 1 3-6 jrs/sem / 3-6 days/week 2 2-3 jrs/sem / 2-3 days/week 3 1 jr/sem / 1 day/week 4 Moins souvent/Less often 5 Jamais/Never 6 Ne sait pas/Don't know 7	Au travail/At work A la maison/At home Dans les lieux publics /At social gatherings	☐ ☐ ☐
S 8	Pensez-vous que le tabac soit dangéreux pour la santé ? Do you think that tobacco can damage health?		Oui / Yes 1 Non / No 2 Ne sait pas/Don't know 3	☐
S 9	Pensez-vous qu'être exposé à la fumée du tabac des autres soit dangéreux pour la santé? Do you think that being exposed to other people smoking can damage health ?		Oui / Yes 1 Non / No 2 Ne sait pas/Don't know 3	☐

Consommation d'alcool
Alcohol consumption (Section A)

Les questions suivantes concernent la consommation d'alcool.
The next questions ask about the consumption of alcohol

A 1a	Avez-vous déjà consommé une boisson alcoolisée, comme de la bière, du vin, du cidre, un alcool fort ou du vin du palme, du bil bil, du arki odontol etc. *Have you ever consumed a drink that contains alcohol such as beer, wine, spirit, palm wine, corn beer, 'bil bil' and 'arki' or 'afofo'?*	Oui / Yes =1 Non / No =2	Si non, aller à / If no, go to A 8	☐

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A 1b	Si oui, consommez-vous actuellement des boissons contenant de l'alcool? *If yes, do you currently consume alcoholic drinks?*	Oui/Yes = 1 Non/No = 2	Si non, aller à If no, go to A 8	☐
A 1c	A quel âge avez-vous commencé à boire ? *At what age did you start drinking?*		Age en années Age in years	☐☐
A 2	Avez-vous consommé une boisson contenant de l'alcool au cours des 12 derniers mois? *Have you consumed any alcoholic drink within the past 12 months?*	Si non, aller à If no, go to A 6	Oui / Yes 1 Non / No 2	☐
A 2a	Parmi les boissons alcoolisées suivantes, lesquelles consommez-vous ? *Among the following alcoholic drinks, which ones do you consume?* *Pour chaque type de boisson/For each type of drink,* *Oui/Yes 1* *Non/No 2*	Bière / *Beer*.....		☐
		Vin (rouge ou blanc)/ *Wine*.....		☐
		Vin du palme / *Palm wine*.....		☐
		Whisky / *Whisky*.....		☐
		Bil bil / *Bil bil or corn beer*.....		☐
		Verre de arki / *Glass of arki*.....		☐
A 2b	Au cours des 12 derniers mois, **à quelle fréquence** avez-vous consommé les boissons alcoolisées suivantes? *In the past 12 months, **how frequently** have you consumed the following alcoholic drinks?* ≥ 5 jours par semaine / *≥ 5 days a week*.....1 1-4 jours par semaine / *1-4 days per week*.....2 1-3 jours par mois / *1-3 days a month*.....3 < 1 fois par mois / *< 1 a month*.....4 Jamais/Never.....5	Bouteille de bière / *Bottle of beer*.....		☐
		Verre de vin / *Glass of wine*.....		☐
		Coupe de vin du palme / *Cup of palm wine*.....		☐
		Une consommation de whisky / *Shot of spirit*.....		☐
		Coupe de bil bil/ *Bowl of bil bil or corn beer*.....		☐
		Verre de arki / *Glass of arki*.....		☐
A 3	Lorsque vous buvez de l'alcool, combien de boissons alcoolisées buvez-vous par jour, **en moyenne?** *When you consume alcohol, **on average**, how many drinks do you have during a day?*			☐☐
A 4	**Si l'on considère la boisson alcoolisée que vous consommez le plus, au cours des 7 derniers jours**, combien en avez-vous bues chaque jour? (Notez la quantité pour chaque jour) (CODE 00 POUR PAS D'ALCOOL 99 POUR "NE SAIT PAS" ET 77 POUR "REFUSE") *If we consider the alcoholic drink that you MOSTLY consume, during each of the **past 7 days**, how many standard drinks did you have each day?* *(RECORD FOR EACH DAY)* *(CODE 00 FOR NO ALCOHOL CONSUMED, 99 FOR DON'T KNOW AND 77 FOR REFUSED)*	Lundi / *Monday*		☐☐
		Mardi / *Tuesday*		☐☐
		Mercredi / *Wednesday*		☐☐
		Jeudi / *Thursday*		☐☐
		Vendredi / *Friday*		☐☐
		Samedi / *Saturday*		☐☐
		Dimanche / *Sunday*		☐☐
A 5c	Avez-vous envie de cesser de boire ? *Do you want to stop drinking alcohol?*	Si PAS TOUT, aller à If NOT AT ALL, go to A 8	Pas du tout/ Not at all 1 Un peu/Not really 2 Moyennement/ Undecided 3 Beaucoup/want to stop 4	☐
A 5d	Pensez-vous pouvoir réussir à arrêter de boire dans les deux semaines à venir ? *Do you think that you can succeed to stop drinking alcohol over the next two weeks?*		Non/No 1 Peut-être/May be 2 Vraisemblablement/Probably 3 Certainement/certainly 4 Ne sait pas/Don't know 5	☐

Site |__| Zone |__| Bloc |__| Household No |__|__|__/__|__| Subject Code |__|__|

Les questions **A6 et A7** consement uniquement les **EX BUVEURS**
Questions **A6 and A7** are only for **EX DRINKERS**

A 6	A quel âge avez-vous arrêté de boire? *At what age did you stop drinking?*		☐☐
A 7	Pourquoi avez-vous arrêté de boire ? *Why did you stop drinking?*		_____
A 8	Pensez-vous que l'alcool soit dangereux pour la santé ? *Do you think that alcoholic drinks can damage health?*	Oui/Yes 1 Non/No 2 Ne sait pas 3	☐
A 9	**Sauter cette question si le répondant consomme de l'alcool** **Skip this question if the respondent drinks alcohol** Si vous ne consommez pas de boissons alcoolisées, pour quel motif ? *If you do not drink alcoholic beverages, why don't you?*	Je n'aime pas le goût/ dislikes the taste 1 A cause des effets de l'alcool/because of alcohol 2 Mon médecin l'interdit/Dr denied it 3 Pr des pb de poids/bc of my weight. 4 Pr des pb de santé/bc of my health 5 Autre raison/other reasons 6 Specifier_____	☐

Consommation d'alcool Elargie / *EXPANDED: Alcohol* (Section A)

Passer à N 1 si le répondant n'a pas consommé l'alcool au cours des 12 derniers mois
Skip to N 1 if the respondent did not consume alcoholic drinks during the past 12 months

A 10	<u>**Pour les hommes / *For men only*:**</u> Au cours des 12 derniers mois, **combien de jours** avez-vous bu au moins cinq boissons alcoolisées? *In the past 12 months, on how many days did you have **five or more** alcoholic drinks in a single day?*	☐☐☐
A 11	<u>**Pour les femmes / *For women only*:**</u> Au cours des 12 derniers mois, **combien de jours** avez-vous bu au moins quatre boissons alcoolisées? *In the past 12 months, on how many days did you have **four or more** alcoholic drinks in a single day?*	☐☐☐
A 12	<u>**Pour tout le monde / *For everyone*:**</u> Au cours des 12 derniers mois, quel était le **plus** grand nombre de boissons alcoolisées que vous avez eu à prendre à la même occasion ? *In the past 12 months, what was the **largest number** of drinks you had on a single occasion, counting all types of alcoholic drinks together?*	☐☐☐

Habitudes alimentaires et prise de poids/Dietary habits and weight gain

Les questions suivantes portent sur votre consommation habituelle de fruits et légumes, et votre comportement vis-à-vis de votre poids.

The next questions ask about the fruits and vegetables that you usually eat, and your attitude towards your weight.

N 1	Habituellement, combien de jours par semaine consommez-vous **des fruits**? *In a typical week, on how many days do you **eat fruits**?*		☐
N 2	Habituellement, combien de jours par semaine consommez-vous **des légumes**? *In a typical week, on how many days do you **eat vegetables**?*		☐
N 3	En moyenne, combien de repas prenez-vous par jour ? *On average, how many meals do you usually take a day?*		☐
N 4a	Où prenez-vous votre repas du midi en semaine ? *Where do you have your lunch during week days?*	A la maison/at home 1 Au travail/at work 2 Aux deux endroits/both places 3 Restaurant/Restaurant 4 Autre /other 5 Specifier_____	☐
N 4b	Où prenez-vous votre repas du soir en semaine ? *Where do you have your supper during week days?*	A la maison/at home 1 Au travail/at work 2 Aux deux endroits/both places 3 Restaurant/Restaurant 4 Autre /other 5 Specifier_____	☐
N 4c	Combien de jour par semaine, du lundi au dimanche, prenez-vous le petit déjeuner ? *How many days in a week do you take breakfast?*		☐

N 5	Ajoutez-vous toujours du sel à vos repas même lorsque les autres pensent qu'il y en a suffisamment ? *Do you always add salt to your food at table even when others in the house think there is enough?*	Oui/Yes 1 Non/No 2	☐
N 6	Ajoutez-vous toujours du sucre à votre thé/café? *Do you always add sugar to your tea/coffee?*	Oui/Yes 1 Non/No 2	☐
N 7	Avez-vous un pèse personne à domicile ? *Do you have a weighing scale at home?*	Oui/Yes 1 Non/No 2	☐
N 8a	A quelle fréquence contrôlez-vous votre poids ? *How often do you check your weight*	Hebdomadairement / *Weekly* 1 Mensuellement / *Monthly* 2 Annuellement / *Yearly* 3 *Occasionnellement/occasionnally* 4 *Jamais/Never* 5 Ne sait pas / *Don't know* 6	☐
N 8b	Quel est le poids le plus élevé que vous ayez jamais eu depuis que vous avez 20 ans (hors grossesse)? *What is your highest weight since you turned 20 years (not including pregnancies)?*		☐☐☐,☐kg
N 9a	Quel est votre poids **actuel** ? *What is your current weight?*		☐☐☐,☐kg
N 9b	Avez-vous pris du poids au cours de ces 12 derniers mois ? *Have you put on weight during the past 12 months?*	***Si NON, ou NSP, If NO or DK go to, N9d***	Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
N 9c	Si oui, combien de kilogrammes ? *If yes, how many kilogrammes?*		☐☐,☐kg
N 9d	Avez-vous perdu du poids au cours de ces 12 derniers mois ? *Have you lost weight during the past 12 months?*	***Si NON ou NSP, If NO or DK, go to N9f***	Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
N 9e	Si oui, combien de kilogrammes ? *If yes, how many kilogrammes?*		☐☐,☐kg
N 9f	Comment trouvez-vous votre poids actuel ? *How do you view your current weight?*	**Si Rép 1, aller à N 11** **Si rép 2, aller à N 10** **Si rép 3, aller à N 10c** **Si rép 4, aller à N 11**	Normal/Normal 1 Elevé/Overweight 2 Bas/Underweight 3 Ne sait pas/ Don't know 4 ☐
N 10	Si vous pensez avoir un excès de poids, à combien de kilogrammes estimez-vous votre excès de poids ? *If you think that you are overweight, how many kilogrammes do you evaluate your excess weight to be?*		☐☐,☐kg
N 10a	Si vous pensez avoir un excès de poids, désirez-vous perdre du poids ? *If you think that you are overweight, would you like to lose weight?*	***Si NON ou NSP, aller à If NO or DK, go to N11***	Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
N 10b	Combien de kilogrammes souhaiteriez-vous perdre ? *How many kilogrammes would you like to cut down?*	***PUIS, aller à N 11 THEN, go to N11***	☐☐,☐kg
N 10c	Si vous pensez avoir un sous poids, à combien de kilos estimez-vous votre déficit de poids ? *If you think you are underweight, at how many kilogrammes are you below your normal weight?*		☐☐kg
N 10d	Si vous pensez avoir un sous poids, voulez-vous prendre du poids ? *If you think you are underweight, would you like to gain weight?*		Oui/Yes 1 Non/No 2 Ne sait pas/Don't know 3 ☐
N 11	Suivez-vous actuellement un régime amaigrissant ? *Are you on weight loss diet at the moment?*		Oui/Yes 1 Non/No 2 ☐
N 12	Si vous aviez la possibilité de modifier votre poids maintenant, qu'aimeriez-vous faire ? *If you had the possibility to modify your weight, what would you like to do?*		Perdre du poids/ lose weight 1 Maintenir mon poids/ Maintain weight 2 Prendre du poids/Gain weight 3 Ne sait pas /Don't know 4 ☐
N 12a	Si vous désirez perdre du poids, pourquoi? *If you would like to lose weight, why?*		_____
N 12b	Si vous désirez maintenir votre poids, pourquoi? *If you would like to maintain your weight, why?*		_____

N 12c	Si vous désirez prendre du poids, pourquoi? *If you would like to gain weight, why?*	_____
N 13	Parmi les facteurs suivants, quels sont ceux qui à votre avis influencent le plus (premier et deuxième) la prise de poids ? *Among the following factors, which ones do you think have the first and the second most important influences on weight gain?*	1. Activité physique - exercice/Physical activity – exercise ☐ 1. 2. Consommation de sucre/Sugar intake ☐ 2. 3. Hérédité / Hereditary 4. Consommation d'aliments /Food consumption 5. Consommation d'alcool / Alcohol intake 6. Consommation de graisses / Fat intake 7. La pauvreté / Poverty 8. Le mariage / Marriage 9. Autres/Others _____
N 14	Votre poids, votre corpulence, pour vous : *Your weight, your built for you :*	N'ont pas d'importance particulière/ Are of no particular importance 1 Interviennent dans l'image que vous avez de vous/Determine your self image 2 Font partie des choses importantes pour l'image que vous avez de vous/Are one of the things that determine your self image 3 Sont ce qui comptent le plus pour vous/Are the most important thing that matters to you 4 ☐
N 15	Avez-vous déjà essayé de perdre du poids ? *Have you ever tried to lose weight?* **Si JAMAIS, aller à P1** **If NEVER, go to P 1**	Jamais/Never 1 Une seule fois/Once 2 Une fois par an/Once a year 4 Deux ou trois fois par an/twice a year 5 Plus de 3 fois par an/more than 3 times a year 6 Pratiquement tout le temps/Almost all the time 7 ☐
N 16	Si vous avez déjà essayé de perdre du poids, quelle en était la raison ? *If you have ever tried to lose weight, why did you?* Oui/Yes 1 Non/No 2	Pour des raisons de santé/For health reasons ☐ Pour des raisons de beauté/For my appearance ☐ Pour atteindre mon poids idéal/ To have ideal weight ☐ Les autres me trouvent obèse/others think that I am overweight ☐ Pour d'autres raisons/For other reasons ☐ Spécifier _____
N 17	Si vous avez déjà essayé de perdre du poids, quelles méthodes avez-vous utilisé? *If you have ever tried to lose weight, which method did you use?* Oui/Yes 1 Non/No 2	Régime alimentaire/Weight loss diet ☐ Prise de médicaments/ Take drugs ☐ Exercice physique/Physical activity-exercise ☐ Sauter des repas/Skip meals ☐ Médicaments traditionnels/Traditional medicine ☐ Autres/others ☐ Spécifier _____

Activité physique / *Physical activity*

Je vais maintenant vous poser quelques questions concernant différents types d'activité physique. Veuillez y répondre même si vous ne vous considérez pas comme quelqu'un d'actif.

Pensez tout d'abord au temps que vous consacrez au travail, qu'il s'agisse d'un travail rémunéré ou non, des tâches ménagères, de cueillir ou récolter des aliments, de pêcher ou chasser pour de la nourriture, de chercher un emploi. *[Ajouter d'autres exemples si nécessaire]*

Next I am going to ask you about the time you spend doing different types of physical activity. Please answer these questions even if you do not consider yourself to be an active person.

Think first about the time you spend doing work. Think of work as the things that you have to do such as paid or unpaid work, household chores, harvesting food, fishing or hunting for food, seeking employment and running errands.

P 1	Est-ce que votre travail s'effectue la plupart du temps en position assise ou debout, sans marcher plus de 10 minutes d'affilée? *Does your work involve mostly sitting or standing, with walking for no more than 10 minutes at a time?*	Oui / *Yes* 1 Non / *No* 2	***Si non, aller à*** ***If No, go to P6***	☐
P 2	Est-ce que votre travail comprend des activités physiques intenses, comme soulever des charges lourdes, creuser, effectuer du travail de maçonnerie ou des travaux champêtres durant au moins 10 minutes d'affilée? *Does your work involve vigorous activity, like [heavy lifting, digging or construction work or farm work] for at least 10 minutes at a time?*	Oui / *Yes* 1 Non / *No* 2	***Si non, aller à*** ***If No, go to P4***	☐
P 3a	Habituellement, combien de jours par semaine effectuez-vous des activités physiques intenses dans le cadre de votre travail? *In a typical week, on how many days do you do vigorous activities as part of your work?*			☐
P 3b	Lors d'une journée habituelle durant laquelle vous effectuez des activités physiques intenses, durant combien de minutes effectuez-vous ces activités? *On a typical day on which you do vigorous activity, how many minutes do you spend doing such work?*			☐☐☐
P 4	Est-ce que votre travail comprend des activités physiques moyennement intenses, comme soulever une charge légère durant au moins 10 minutes d'affilée? *Does your work involve moderate-intensity activity, like brisk or quick walking [for carrying light loads] for at least 10 minutes at a time?*	Oui / *Yes* 1 Non / *No* 2	***Si non, aller à*** ***If No, go to P6***	☐
P 5a	Habituellement, combien de jours par semaine effectuez-vous des activités physiques moyennement intenses dans le cadre de votre travail? *In a typical week, on how many days do you do moderate-intensity activities as part of your work?*			☐
P 5b	Lors d'une journée habituelle durant laquelle vous effectuez des activités physiques moyennement intenses, durant combien de minutes effectuez-vous ces activités? *On a typical day on which you did moderate-intensity activities, how many minutes do you spend doing such work?*			☐☐☐ minutes
P 6	Combien de temps (en heures) dure habituellement une de vos journées de travail? *How long (in hours) is your typical workday?*			☐☐

Sans tenir compte des activités que vous avez déjà mentionnées, j'aimerais vous demander comment vous effectuez vos déplacements pour aller au travail, faire des achats, ou pour aller à l'église

Other than activities that you've already mentioned, I would like to ask you about the way you travel to and from places for example to work, for shopping, to market, to church

P 7	Est-ce que vous effectuez des trajets d'au moins 10 minutes à pied ou à vélo? *Do you walk or use a bicycle (pedal cycle) for at least 10 minutes continuously to get to and from places?*	Oui / *Yes 1* Non / *No 2*	***Si non, aller à*** ***If No, go to P9***	☐
P 8a	Habituellement, combien de jours par semaine effectuez-vous des trajets d'au moins 10 minutes à pied ou à vélo? *In a typical week, on how many days do you walk or bicycle for at least 10 minutes to get to and from places?*			☐
P 8b	Lors d'une journée habituelle, durant combien de temps vous déplacez-vous à pied ou à vélo? *How much time would you spend walking or cycling for travel on a typical day?*			☐☐☐ minutes

Les questions suivantes concernent les activités que vous effectuez durant votre temps libre, par exemple vos loisirs, ou vos activités sportives. Ne tenez pas compte des activités physiques liées à votre travail ou à vos déplacements, que vous avez déjà mentionnés auparavant.

The next questions ask about activities that you do in your leisure time, for recreation or fitness for example sports [in-door and out-door]. Do not include the physical activities you do at work or for travel mentioned already.

P 9	Durant votre temps libre, êtes-vous la plupart du temps en position assise, couchée, ou debout, sans activité physique d'au moins 10 minutes d'affilée? *Does your [recreation, sport or leisure time] involve mostly sitting, reclining, or standing, with no physical activity lasting more than 10 minutes at a time*	Oui / *Yes* 1 Non / *No* 2	Si oui, *If Yes, go to* P 14	☐
P 10a	Durant votre temps libre, vous arrive-t-il d'effectuer une activité physique intense comme courir, pratiquer un sport, soulever des poids, durant au moins 10 minutes d'affilée? *In your [leisure time], do you do any vigorous activities like [running or strenuous sports (like football, tennis and gymnastics), weight lifting] for at least 10 minutes at a time?*	Oui / *Yes* 1 Non / *No* 2	Si oui, *If Yes, go to* P 12	☐
P 10b	Quel est votre activité sportive préférée ? *What is the favourite sporting activity you practice?*	_____		
P 10c	A quelle fréquence la pratiquez-vous ? *How often do you practice it?*	Journalière / *Daily* 1 2 fois par semaine / *Twice a week* 2 1 fois par semaine / *Once a week* 3 1 fois par mois / *Once a month* 4 > à plus d'un mois / *> a month* 5 6		☐
P 11a	Habituellement, lors de combien de jours par semaine effectuez-vous une activité physique intense durant votre temps libre? *In a typical week, on how many days do you do vigorous activities as part of your [leisure time]*			☐
P 11b	Lors d'une journée habituelle, combien de temps y consacrez-vous? *How much time (in minutes) do you spend doing this on a typical day?*			☐☐☐ minutes
P 12	Durant votre temps libre, vous arrive-t-il d'effectuer une activité physique moyennement intense comme marcher rapidement, nager, faire du vélo, durant au moins 10 minutes d'affilée? *In your [leisure time], do you do any moderate-intensity activities like brisk walking,[cycling or swimming] for at least 10 minutes at a time?*	Oui / *Yes* 1 Non / *No* 2	Si non aller à *If No go to* P14	☐
P 13a	Si Oui / *If Yes* Habituellement, combien de jours par semaine effectuez-vous une activité physique moyennement intense durant votre temps libre? *In a typical week, on how many days do you do moderate-intensity activities as part of your [leisure time]?*			☐
P 13b	Lors d'une journée habituelle, combien de temps (en minutes) y consacrez-vous? *How much time (in minutes) do you spend doing this on a typical day?*			☐☐☐

La question suivante concerne le temps passé en position assise ou couchée. En considérant les 7 derniers jours, souvenez-vous du temps passé au travail, à la maison, à vos loisirs, à rendre visite à des amis, à lire, à regarder la télévision, y compris le temps passé assis à un bureau, mais sans inclure le temps passé à dormir.

The following question is about sitting or reclining. Think back over the past 7 days, to time spent at work, at home, at [leisure], including time spent sitting at a desk, visiting friends, reading, or watching television, but do not include time spent sleeping.

P 14	Durant les 7 derniers jours, combien de temps (en heures) par jour avez-vous passé en position assise ou couchée, en moyenne ? *Over the past 7 days, how much time (in hours) did you spend sitting or reclining on a typical day?*	☐☐☐

ELARGIE - Antécédents d'hypertension artérielle, de Diabète, d'AVC et d'Obésité
EXPANDED - History of High Blood pressure, Diabetes, Stroke, Obesity

Hypertension artérielle / *Blood Pressure*

H 1	Quand est ce que votre tension artérielle a été prise pour la dernière fois par un personnel de la santé? *When was your blood pressure last measured by a health professional?*	< 12 mois/ *< 12 months* 1 1-5 ans / *1-5 years ago* 2 > 5 ans / *> 5 yrs* 3 *Jamais/Never* 4	☐
H 2	Pour quelle raison votre pression artérielle a-t-elle été mesurée à cette occasion ? For what reason was your BP measured on that occasion?	*J'étais malade/I was sick* 1 Contrôle de routine/Routine control 2 Dépistage/Screening 3 *J'avais demandé/I asked for* 4 Autre/Other 5 Specifier_____	☐
H 3	A quelle fréquence votre pression artérielle est-elle contrôlée ? *How often is your BP checked?*	*Quotidiennement* 1 Semaine / *Weekly* 2 Mois / *Monthly* 3 Annuel / *Annually* 4 *Occasionnellement* 5 NSP / *Don't know* 6 *Jamais/Never* 7	☐
H 4	Est-ce qu'un professionnel de la santé vous a déjà dit que votre tension artérielle est élevée? *Has a doctor or other health worker ever told you that you have elevated blood pressure or hypertension?*	Oui / *Yes* 1 Non / *No* 2 **SI NON, aller / If NO, go to H 15**	☐
H 5	Depuis combien de temps a-t-on diagnostiqué l'HTA ? *How long ago were you diagnosed as hypertensive?*	☐☐☐☐ **Mois/months**	

Diabète / *Diabetes*

H 1a	Quand est ce que votre glycémie a été contrôlée pour la dernière fois par un personnel de la santé? *When was your blood glucose last measured by a health professional?*	< 12 mois/ *< 12 months* 1 1-5 ans / *1-5 years ago* 2 > 5 ans / *> 5 yrs* 3 *Jamais/Never* 4	☐
H2a	Pour quelle raison votre glycémie a-t-elle été mesurée à cette occasion ? For what reason was your blood sugar measured on that occasion?	*J'étais malade/I was sick* 1 Contrôle de routine/Routine control 2 Dépistage /Screening 3 *J'avais demandé/I asked for* 4 Autre/Other 5 Specifier_____	☐
H 3a	Avez-vous contrôlé votre glycémie au cours des 12 dernier mois? *Have you had your blood sugar measured in the last 12 months?*	Oui / *Yes* 1 Non / *No* 2	☐
H 4a	Est-ce qu'un professionnel de la santé vous a déjà dit que vous avez le diabète ? *Has a doctor or other health worker ever told you that you have diabetes*	Oui / *Yes* 1 Non / *No* 2 **SI NON, aller / If NO, go to H 15**	☐
H 5a	Depuis combien de temps a-t-on diagnostiqué le diabète ? *How long ago were you diagnosed as diabetic?*	☐☐☐☐ **Mois/months**	

Est-ce que vous prenez actuellement un des traitements suivants contre l'hypertension artérielle ou le diabète prescrit par un professionnel de la santé?
Are you currently receiving any of the following treatments for high blood pressure or diabetes prescribed by a doctor or other health worker?

H 7	Si vous avez été déclaré hypertendu, pour chacune des questions de **H7 à H13**, répondre par : If you have been declared hypertensive, for each of the questions **H7 to H13**, the answer could be: Des médicaments pour soigner l'HTA au cours des 2 dernières semaines ? *Drugs to control your blood pressure during the last 2 weeks?*	Oui / *Yes* 1 Non / *No* 2 *Ne sait pas* 3	☐
H 8	Un régime alimentaire spécial ? *Special prescribed diet?*		☐
H 9	Conseil ou traitement pour perdre le poids? *Advice or treatment to lose weight?*		☐
H 10	Conseil ou traitement pour arrêter de fumer ? *Advice or treatment to stop smoking?*		☐
H 11	Conseil pour débuter ou pratiquer davantage des activités physiques ? *Advice to start or do more exercise?*		☐

H 7a	Si vous avez été déclaré diabétique, pour chacune des questions de **H7a à H14a**, répondre par : If you have been declared diabetic, for each of the questions **H7a to H14a**, the answer could be: Insuline ? *Insulin?*	Oui / *Yes* 1 Non / *No* 2 *Ne sait pas* 3	☐
H 8a	Des médicaments par voie orale pour baisser la glycémie au cours des 2 dernières semaines) ? *Oral drug to control your blood sugar during the last 2 weeks?*		☐
H 9a	Régime spécial ? *Special prescribed diet?*		☐
H10a	Conseil ou traitement pour perdre le poids? *Advice or treatment to lose weight?*		☐
H11a	Conseil ou traitement pour arrêter de fumer ? *Advice or treatment to stop smoking?*		☐

H 12	Avez-vous consulté un tradi-praticien pour l'hypertension artérielle au cours des 12 derniers mois ? *During the past 12 months have you seen a traditional healer for elevated blood pressure or hypertension?*	☐		H12a	Conseil pour débuter ou pratiquer davantage des activités physiques ? *Advice to start or do more exercise?*	☐
H 13	*Si Oui* Prenez-vous actuellement un traitement traditionnel contre votre hypertension ? *If Yes are you currently taking any herbal or traditional remedy for your high blood pressure?*	☐		H13a	Avez-vous consulté un tradi-praticien pour le diabète au cours des 12 derniers mois ? *During the past 12 months have you seen a traditional healer for diabetes?*	☐
				H 14	*Si Oui*: Avez-vous pris un traitement traditionnel contre le diabète au cours des 2 dernières semaines ? *If Yes, have you taken any herbal or traditional remedy for your diabetes in the last two weeks?*	☐
H 15	Est-ce qu'un professionnel de la santé vous a dit que vous avez un sur poids ou une obésité ? *Has a doctor or other health worker ever told you that you were overweight or obese?*				Oui / *Yes* 1 Non / *No* 2	☐

Mesures cliniques et anthropométriques / Clinical and anthropometric measures

Pression artérielle/Blood pressure (1)	systolique		mmHg	diastolique		mmHg
Pression artérielle/Blood pressure (2)	systolique		mmHg	diastolique		mmHg
	Pouls 1		Bpm	Pouls 2		Bpm
Taille du brassard/Cuff size		(Petit/small = 1; Normal /normal= 2; Grand/Large = 3)			
Taille/Height		Cm	Poids/weight		kg
Tour de taille/Waist circumference 1		cm	Tour de taille/Waist circumference 2		cm
Tour de hanches/ Hip circumference 1		cm	Tour de hanches/ Hip circumference 2		cm
Tour du bras droit/right arm circumference 1		cm	Tour du bras droit/Right arm circumference 2		cm
Pli bicipital/Biceps fold 1		cm	Pli bicipital/Biceps fold 2		cm
Pli tricipital/Triceps fold 1		cm	Pli tricipital/Triceps fold 2		cm
Pli sous-scapulaire/subscapular fold 1		cm	Pli sous-scapulaire/Suprascapular fold 2		cm
Pli sus-iliaque/suprailiac fold 1		cm	Pli sus-iliaque/Suprailiac fold 2		cm
Impédancemétrie/Impedance		Ohms	Masse grasse/Fat mass		kg
Graisse/Body fat		%	Masse maigre/Lean mass		kg
Weight /Poids (TANITA)		kgs			

FIN

2NDE ENQUETE EN POPULATION CAMBOD - 2ND POPULATION-BASED CAMBOD STUDY

COMPOSANTE ASSOCIEE A LA PROMOTION DE LA SANTE
HEALTH PROMOTION COMPONENT

Maintenant, nous allons parler de plusieurs comportements et attitudes en rapport avec la santé. Je vais vous énoncer quelques idées ; pour chacune d'elles, vous me direz si vous êtes d'accord ou non.
Now we are going to talk about various behaviours and health. I am going to read out some statements to you. For each of the statements, please state the degree to which you agree with it

	Pour chacun des énoncés suivants, dites à quel degré vous êtes d'accord avec son contenu (de fortement d'accord à fort désaccord. Si vous ne savez pas, choisir l'option « Ne sait pas » (lire les options) *For each of the following statements, state the degree to which you agree with it (from strongly agree to strongly disagree. In case you do not know, please select the "don't know "option) (read out options)*	Fortement d'accord/Strongly agree	1	
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 1	La consommation excessive de sucre cause le diabète *High consumption of sugar causes diabetes to develop*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 2	Le risque d'avoir le diabète parce qu'on consomme beaucoup de sucre peut être neutralisé en mangeant ou buvant des boissons amères comme l'eau du ndolé, la Guinness, l'Aloe Vera etc. *The risk of developing diabetes from having too much sugar in the diet can be neutralized by eating or drinking bitter liquid substances, e.g. Guinness, Liquid from bitter leaves, ndolé, aloe Vera etc.*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 3	Le diabète peut se transmettre sexuellement *Diabetes can be transmitted Sexually.*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
		Ne sait pas/Don't Know	5	
Q 4	Le diabète peut se transmettre par l'hérédité *Diabetes can be inherited genetically from parents*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 5	Le diabète est surtout une maladie des riches *Diabetes is a disease mostly of the rich.*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 6	Ce sont seulement les personnes âgées qui font le diabète *Only old people develop diabetes*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 7	Le diabète est mieux pris en charge par le traitement médical *Diabetes is better managed by medical treatment*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	

Q 8	Le diabète est mieux pris en charge par le traitement traditionnel *Diabetes is better managed by traditional treatment*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 9	Avoir un excès de poids augmente les risques d'avoir le diabète *Having excess weight increases the risk of developing diabetes.*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 10	L'activité – l'exercice physique a plusieurs effets bénéfiques sur la santé *Physical activity/exercise has numerous beneficial effects on health*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	
Q 11	Manger beaucoup de graisses et d'aliments frits et prendre du poids augmentent les risques d'avoir le diabète *Eating lots of fatty and fried foods and gaining excess weight increase the risk of developing diabetes*	Fortement d'accord/Strongly agree	1	☐
		D'accord/Agree	2	
		Désaccord/Disagree	3	
		Fort désaccord//Strongly disagree	4	
		Ne sait pas/Don't Know	5	

Q 12	Le diabète peut-il être prévenu? *Can Diabetes be Prevented?*	**Si NON, aller à Q 14** **Si ne sait pas, aller à Q 15**	Oui / Yes = 1 Non / No = 2 Ne sait pas /Don't know = 3	☐

Q 13	Si oui, en faisant quoi? *If Yes, by doing what?*	**Oui / Yes =1, *Non / No= 2 Ne sait pas/ /Don't know =3***	**Code**
		Réduire la consommation de sucre Reducing the intake of sugar	☐
		Exercice régulier Exercising regularly	☐
		Contrôler la prise de poids Controlling weight gain	☐
		Éviter de fumer Avoid smoking	☐
		Réduire la consummation d'alcool Reducing alcohol consumption	☐
		Autres (spécifier) Other (Specify)	

Q 14	Si non, pourquoi? *If No, why?*	

Q 15	Selon vous, lesquelles des activités ci-contre pourraient vous aider à contrôler votre poids ? *In your opinion, which of the following physical activities are likely to help you control your weight?*	**Oui/Yes = 1 *Non/No = 2 Ne sait pas/Don't know =3***	**Code**
		Exercice physique Physical exercise	☐
		Cultiver et jardiner Farming and gardening	☐
		Fendre du bois Wood chopping	☐
		Faire le ménage House keeping	☐
		Débrousser le champs Grass cutting and yard cleaning	☐
		Danser Dancing	☐
		Creuser et planter Digging and planting	☐
		Marcher et se promener Walking and strolling	☐
		Travaux ménagers (cuisiner, laver les habits) House chores e.g. cooking and laundry	☐

Q 16	Avez-vous entendu ou regardé des messages d'éducation sanitaire sur l'obésité, l'hypertension artérielle ou le diabète au cours des 3 dernières années? *Have you heard or seen any education messages on obesity, high blood pressure or diabetes during the last 3 years?*	Si NON ou NSP, aller à If NO or DK, go to **Q 19**	Oui / yes = 1 Non / no = 2 Ne sait pas/*Don't know*3	☐
Q 17	Si oui, où? *If yes, where?*	1. _____ 2. _____ 3. _____		
Q 18	Quel est le principal message que vous avez retenu de cette source d'information? *What principal message do you remember from the source of information?*	1. _____ 2. _____ 3. _____		
Q 19	Avez-vous consulté du matériel d'éducation (posters, dépliants, autocollants, etc) sur l'obésité, l'hypertension artérielle ou le diabète au cours des 3 dernières années ? *Have you seen any education material (posters, handouts, leaflets) on obesity, high blood pressure or diabetes during the last 3 years?*	**Si NON, If NO, go to Q 22a**	Oui / yes = 1 Non / no = 2	☐
Q 20	Si oui, quel est le principal message que vous en avez retenu? *If yes, what is the message you remember most from it?*	_____		
Q 21	Où avez-vous vu ce matériel d'éducation sanitaire? *Where did you see it?*	_____		

Q 22a	Avez-vous vu, lu ou entendu des informations sur le diabète à travers les sources suivantes : *Have you seen, read or heard something about diabetes in :*	Oui / Yes 1 Non / No 2	
		1. Formations sanitaires / Health Facilities	☐
		2. Guérisseurs traditionnels /Traditional Healers	☐
		3. Télévison et radio / TV and Radio	☐
		4. Journaux-magazines/Newspaper-Magazine	☐
		5. Eglises – Mosquées / Churches - Mosques	☐
		6. Ecoles / Schools	☐
		7. Un dépliant / A leaflet	☐

		8. Un autocollant / Sticker	☐
		9. Un poster / Poster	☐
		10. Ami ou relation/ friand or relation	☐
		11. Autre (Spécifier) Other (Specify)	

Q 22b	Avez-vous entendu ou vu l'un quelconque des messages suivants? *Have you seen or heard any of the following messages*	Oui/Yes = 1 Non/no = 2 Ne sait pas / don't know = 3	Si oui, utiliser les codes ci-dessus pour décrire la source de l'information (exple : 6 = école)	
		« Faire régulièrement de l'exercice physique » / "Carry out regular physical exercise"	☐	☐☐
		« L'obésité n'est pas un signe de bonne vie » "Obesity is not a sign of good living"	☐	☐☐
		« Faites mesurer votre glycémie maintenant » / "Do a blood sugar test now"	☐	☐☐
		« Ayez une alimentation pauvre en graisses, huile et sucre mais riche en féculents et fibres » / « Eat food with less fat, oil and sugar but rich in starch and fibers »	☐	☐☐
		"Evitez les aliments ou les boissons avec additive en sucre" / « Avoid food or drinks with added sugar »	☐	☐☐
		"Consommez moins de fritures (oeufs, plantains, gateaux, pommes de terre » / "Eat less fried food (eggs, plantains, puff puff, or gateau, irish potatoes"	☐	☐☐
		"Les aliments ou boissons amers ne préviennent pas le diabète. Certains aliments amers contiennent du sucre (Guinness, cola, etc) et doivent être évités »/ "Bitter foods or drinks do not prevent excess blood sugar. Some bitter drinks even contain sugar (Guinness, Kola, etc) and should be avoided"	☐	☐☐
		"L'obésité est l'axe lourd du diabète" / "Obesity is the super high way to diabetes"	☐	☐☐

APPENDIX G

COMITE NATIONAL D'ETHIQUE DU CAMEROUN

N° d'enregistrement : FWA IRB00001954

B.P. 1937 **Tél. : 220 90 75**

Yaoundé, le 27 mai 2003

CLEARANCE ETHIQUE

Le Comité National d'Ethique a examiné ce jour le projet de recherche intitulé :

« CAMEROON BURDEN OF DIABETES PROJECT. »

Introduit par le Docteur MBANYA Jean Claude et collaborateurs.

Le projet n'utilisant aucune méthode invasive préjudiciable au sujet d'étude le Comité National d'Ethique ne formule aucune objection à sa réalisation.

En foi de quoi la présente Clearance Ethique est délivrée pour servir et valoir ce que de droit.

LE PRESIDENT,

Pr. KAPTUE Lazare.

APPENDIX H

UNIVERSITY OF YAOUNDE I

Faculty of medicine and Biomedical Sciences

HoPiT RESEARCH GROUP

Health of Population in Transition, Cameroon

2nd March 2009

Yaoundé Central Hospital
Diabetes & Endocrine Unit
Department of Internal Medicine and Specialities
B.P. 8046 Yaoundé, Cameroon
Tel.: + (237) 231.52.35
Fax: + (237) 231.52.35/222.13.20
E-mail: jean-claude.mbanya@camnet.cm
Prof Jean Claude Mbanya MD, PhD, FRCP(UK)

TO WHOM IT MAY CONCERN: Authorisation to use Dataset

Nyuyki Clement Kufe is authorise to use the dataset of Cameroon Burden of Diabetes (CAMBoD) project survey carried out by Health of Populations in Transition Research Group Cameroon and sponsored by World Diabetes Foundation for his research project as part of MSc in Epidemiology and Biostatistics in School of Public Health, University of Witwatersrand - South Africa.

Prof Jean Claude Mbanya,
Director HoPiT Research Group
Faculty of Medicine and Biomedical Sciences
University of Yaoundé 1 - Cameroon

I

APPENDIX I

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Mr Nyuyki C Kufe

CLEARANCE CERTIFICATE	**M090944**
PROJECT	An Analysis of Diabetes Risk Factors in Yaounde Cameroon: Secondary Data Analysis of Cameroon Burden of Diabetes (CAMBoD) Survey Dataset
INVESTIGATORS	Mr Nyuyki C Kufe.
DEPARTMENT	School of Public Health
DATE CONSIDERED	2009/10/02
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 2009/10/02 **CHAIRPERSON** .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable

cc: Supervisor : Prof KK Grobusch

DECLARATION OF INVESTIGATOR(S)

To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...