

A Nutritional-Health Approach to Local Diets For The Sustainable Prevention of Public Health Conditions—Such as Hypertension, Type 2 Diabetes, Cardiovascular Disease, and Kidney Failure—among Women of Childbearing Age (15–49): A Study of Vulnerable Communities

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Abstract

In Côte d'Ivoire, within economically vulnerable communities, malnutrition linked to undernutrition is occurring within a context of local nutritional transition. This situation leads women of reproductive age to consume increasing amounts of local fast food due to its accessibility, speed of preparation, and low cost. However, this nutritional lifestyle is associated with an increased risk of obesity and chronic diseases, including hypertension, type 2 diabetes, cardiovascular disease, and kidney failure. It is in this context that the present study aims to conduct a nutritional survey among women aged 15 to 49 years in the town of Bingerville, with a view to contributing to the sustainable prevention of public health diseases. The methodology consisted of administering a questionnaire on sociodemographic characteristics and knowledge of their health status related to obesity, cardiovascular diseases, hypertension, type 2 diabetes, and kidney failure, respectively, by measuring body mass index, blood pressure, blood glucose, urea, and creatinine levels, along with knowledge of dietary habits. The results show that 95% of the respondents have a low level of education, 98% are engaged in small-scale trading, and 99% have low incomes. Furthermore, a correlation was observed between dietary habits and body mass index (27), blood pressure, blood glucose, urea, and creatinine levels.

Consuming nutritious local foods is a sustainable strategy for strengthening food security. A substantial reduction in the consumption of added salt and sugar, as well as in the consumption of local fast food, has improved community health, bringing measured parameters back to normal values after three months of monitoring. This approach effectively contributes to the prevention of non-communicable diseases and nutritional disorders linked to poor dietary habits.

Keywords: Women of reproductive age, local fast food, dietary habits, public health diseases.

Introduction

Hypertension, type 2 diabetes, obesity, cardiovascular disease, and kidney failure are major public health concerns among women of reproductive age. Obesity is characterized by excess body mass corresponding to a body mass index (BMI) greater than or equal to 25 kg/m²; it affects approximately 34% of men and 35% of women (PNN, 2017). Obesity-related diseases in Africa are a direct consequence of socioeconomic development and lifestyle changes leading to increased consumption of energy-dense foods and greater sedentary behavior. This lifestyle also contributes to the development of hypertension, type 2 diabetes, obesity, cardiovascular disease, and kidney

failure. The prevalence of hypertension is estimated at 20.4% (Ministry of Health and Public Hygiene, 2015; Kouakou et al., 2020). Type 2 diabetes is associated with poor dietary habits characterized by high consumption of sugar and sugary foods, particularly sugary drinks (PNN, 2016-2020). According to estimates by the World Health Organization, more than 347 million people worldwide suffer from diabetes, and more than 80% of deaths related to this disease occur in low- and middle-income countries. The WHO predicts that by 2030, diabetes will be the seventh leading cause of death worldwide (WHO, 2014). In Côte d'Ivoire, 2008 estimates showed that 9% of adults aged 30 to 70 suffered from hyperglycemia. This situation is thought

to be linked to an unbalanced diet. According to the WHO, a balanced diet should consist of 50 to 55% carbohydrates, 30 to 35% fats, and 10 to 15% protein. Nutritional factors in developing countries like Côte d'Ivoire are largely linked to the excessive consumption of local fast food, resulting in the emergence of public health diseases such as obesity, cardiovascular disease, hypertension, type 2 diabetes, and kidney failure. It is in this context that the present study aims to measure hypertension, blood glucose, LDL cholesterol, urea, and creatinine levels, while also examining the dietary habits of women of reproductive age, in order to provide preventive and sustainable nutritional solutions to these public health diseases. More specifically, it will involve measuring arterial hypertension, measuring plasma concentrations of blood glucose, LDL cholesterol, urea, and creatinine; identifying the foods that make up daily diets; detecting the causes of the aforementioned diseases; and proposing preventive nutritional education for the listed diseases.

Materials and Methods

Study Framework

Bingerville is a town located in southern Côte d'Ivoire, on the edge of the Ébrié Lagoon. It is part of the Autonomous District of Abidjan and the greater Abidjan metropolitan area.

The population is estimated at 91,319 inhabitants, and the languages spoken are French and Ébrié. The town covers an area of 2,119 km². Its geographical coordinates are 5°21.3486' North latitude and 3°53.1222' West longitude. It is bordered by towns such as Alépé, Abidjan, Anyama, and Grand-Bassam. The religions practiced are Christianity and Islam. Like most regions in southern Côte d'Ivoire, the town is characterized by forest vegetation. Its flora is diverse but includes species threatened with extinction due to urban development. The main agricultural activities are the cultivation of oil palms, cassava, and rubber trees.

Equipment

The equipment consists of a blood pressure monitor, a cuff, a measuring tape, and a scale.

Methodology

Survey Form

A dietary survey (Touaitia, 2021) was conducted among 50 women of childbearing age living in a middle-income neighborhood of the Bingerville commune (Abidjan District). Data were collected using a nutritional survey form that recorded the location and participant identification details. The study employed a cross-sectional survey methodology based on face-to-face interviews with women who use local recipes for the prevention of public health conditions; the survey form captured data on dietary habits as well as mean values for body mass index (BMI), blood pressure, blood glucose, urea, and creatinine levels.

Study Procedure

The study was conducted between March and July 2025 using a door-to-door survey method. Prior authorization was obtained from the relevant university authorities. The study's objectives

and procedures were explained to the mothers. Verbal informed consent was obtained from the women surveyed prior to their participation.

Several criteria are considered for recruiting study subjects

Be aged between 15 and 49; have resided in the locality for at least 12 months; be present during the survey period; consent to participate in the survey; consume local fast food; and have at least one of the following conditions: type 2 diabetes, hypertension, cardiovascular disease, or early-stage renal insufficiency.

Methodologies for measuring anthropometric and biochemical parameters in women of reproductive age

In women of childbearing age, the assessment of nutritional and metabolic status frequently relies on measuring body mass index (BMI), blood pressure, blood glucose, cholesterol, urea, and creatinine. The methodologies employed must adhere to international guidelines to ensure the reliability of the results.

Measurement of Body Mass Index (BMI)

BMI is an anthropometric indicator used to assess body build (Sagna et al., 2014). According to World Health Organization (WHO) recommendations, weight is measured using a scale calibrated to a precision of 0.1 kg, while height is measured using a stadiometer with a precision of 0.1 cm. Subjects must be barefoot and lightly clothed. BMI is calculated using the following formula:

$$IMC = \frac{Poids (kg)}{Taille^2 (m^2)}$$

The values obtained are interpreted according to WHO thresholds: underweight (<18.5 kg/m²), normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), and obesity (≥30 kg/m²).

Blood Pressure Measurement

Blood pressure is usually measured using a validated electronic or manual sphygmomanometer. The participant should be at rest for at least 5 minutes, seated with her back supported and her arm at heart level. Two measurements taken a few minutes apart are recommended, and the average is used for analysis. Values are expressed in millimeters of mercury (mmHg). A blood pressure ≥140/90 mmHg is generally considered high in adults (Danho et al., 2021).

Blood Glucose Measurement

Blood glucose is measured on a venous blood sample taken after an 8- to 12-hour fast. The blood is collected in a fluoride tube to limit glycolysis. The analysis is performed using an enzymatic method with glucose oxidase or hexokinase in a biochemistry laboratory. A fasting blood glucose level ≥1.26 g/L generally indicates diabetes, while a value between 1.00 and 1.25 g/L corresponds to prediabetes (Danho et al., 2021).

Cholesterol Measurement

Total cholesterol and lipid fractions (HDL and LDL cholesterol) are measured using a venous blood sample taken after a 9- to 12-hour fast. Biochemical analyses utilize standardized

colorimetric enzymatic methods. LDL cholesterol can be calculated using the Friedewald formula when triglyceride levels are normal:

$$LDL = \text{Cholest rol total} - HDL - \frac{\text{Triglyc rides}}{5}$$

The results are interpreted according to international recommendations regarding cardiovascular risk (Sonou et al., 2018).

Urea Determination

Blood urea is determined from a serum obtained after centrifugation of venous blood. The measurement is generally performed using an enzymatic method with urease. This measurement allows for the assessment of protein metabolism and renal function. Results are expressed in g/L or mmol/L depending on the laboratory (Danho J et al., 2021).

Creatinine Measurement

Serum creatinine is measured in serum using the Jaff  colorimetric method or an automated enzymatic method. This analysis is used to assess renal function. The estimated glomerular filtration rate (eGFR) can then be calculated from the creatinine level, the participant's age, and sex (Danho J et al., 2021).

Results

Table 1: Mean body mass index and blood pressure of the women surveyed

	During the investigation	After the nutritional guidelines
Average body mass index	27	24
Average blood pressure readings	Diastolic 90 Systolic 140	Diastolic 83 Systolic 124

Guidelines on Body Mass Index for women

If BMI < 18.5 Category ← “Underweight, undernutrition”

Else if $18.5 \leq \text{BMI} < 25$ Category ← “Normal weight”

Else if $25 \leq \text{BMI} < 30$ Category ← “Overweight”

Guidelines for arterial hypertension

In adults (≥ 18 years)

Category	Systolic pressure (mmHg)	Diastolic pressure (mmHg)
Optimal blood pressure	< 120	< 80
Normal blood pressure	120 – 129	80 – 84
High-normal blood pressure	130 – 139	85 – 89

Table 4: Dietary habits and frequency of consumption

Local fast-food outlets	Garba	Panini	Spaghetti	Pain condiment	Pork	Sugary drinks
Frequency of consumption	88 %	69 %	72 %	70 %	80%	53%

Table 2: Mean plasma glucose and cholesterol concentrations

	During the investigation	After the nutritional guidelines
Mean plasma glucose concentration	1,20 g/L	1 g/L
Mean plasma cholesterol concentration	1,3 g/L	0,99 g/L

Blood glucose (blood sugar) levels in women

Fasting

- Normal range: 0.70 to 1.00 g/L (3.9 to 5.5 mmol/L)

Abnormal values

- Prediabetes: 1.00 to 1.25 g/L
- Probable diabetes: ≥ 1.26 g/L on two occasions

Hypoglycemia: < 0.70 g/L

LDL cholesterol (“bad cholesterol”) levels in women

Target values

- Optimal: < 1.0 g/L

Abnormal values

- Borderline high: 1.3 to 1.6 g/L

Table 3: Mean plasma urea and creatinine concentrations in the women surveyed

	During the investigation	After the nutritional guidelines
Urea (g/L)	0,48	0,35
Creatinine (mg/L)	9	12

Reference ranges for urea and creatinine in women

Blood urea

Normal value

- Approximately 0.15 to 0.45 g/L

Abnormal values

- High: > 0.45 g/L
- Low: < 0.15 g/L

Blood creatinine

Normal value in women

- Approximately 6 to 11 mg/L (53 to 97 $\mu\text{mol/L}$)

Abnormal values

- High: > 11 mg/L

Statistical Analysis

The survey forms were analyzed using Excel. The collected data underwent descriptive analysis. The nutritional surveys conducted yielded quantitative data. A Newman-Keuls test with a classification criterion at a 5% significance level was performed to assess the statistical significance of the means. The test was conducted using Statisticat version 7.1.

Discussion

The socioeconomic data collected in this study highlight a low level of education and income among the women surveyed, associated with a sedentary lifestyle and moderate alcohol consumption, without tobacco use. These factors are important determinants of dietary behaviors and the risk of non-communicable diseases. The results obtained in Bingerville reveal a significant prevalence of overweight and grade 1 hypertension among women of reproductive age. The average body mass index (BMI) observed was 27 kg/m², indicating overweight, with some participants improving to an average value of 24.5 kg/m² after nutritional intervention. A positive correlation between BMI and blood pressure was found, confirming that excess weight is a major risk factor for hypertension. Systolic blood pressure (SBP) values between 140 and 159 mmHg and diastolic blood pressure (DBP) values between 90 and 99 mmHg correspond to grade 1 hypertension. However, some extreme cases presented with high values (SBP $\geq$ 180 mmHg and DBP $\geq$ 110 mmHg), reflecting more severe conditions requiring urgent management. These observations are consistent with the general trend observed in low- and middle-income countries, where non-communicable diseases, particularly obesity and hypertension, are steadily increasing. They corroborate national data from the National Nutrition Program (NNP, 2016). Furthermore, these results are consistent with the work of Popkin (2001; 2017) on the nutritional transition, which describes a rapid shift towards diets high in calories, fats, and sugars, but low in essential micronutrients. The study shows that the eating habits of women in Bingerville are largely based on the consumption of local fast foods such as garba, panini, bread with condiments, spaghetti and pork. These foods have a high energy density, often exceeding nutritional recommendations. For example, garba and panini have energy values of approximately 337.14 ± 12.55 kcal/100 g dry weight and 363.91 ± 10.48 kcal/100 g dry weight, respectively (Dao, 2024). This high energy density is due to the use of ingredients rich in carbohydrates and fats, including palm oil, wheat flour, and cassava. The widespread use of these foods is explained by their low cost, availability, and ability to provide rapid satiety, which aligns with Popkin's (2001) observations that low-resource populations favor energy-dense foods. This phenomenon is also influenced by cultural and social factors. A similar situation is observed in other urban areas such as Yopougon, where economic constraints lead to dietary choices favoring less expensive but nutritionally unbalanced options. Nutritionally, the foods consumed are characterized by a high content of saturated fats and simple carbohydrates, as well as a low content of quality protein, dietary fiber, and micronutrients. This imbalance is concerning because it is associated with an increased risk of obesity,

cardiovascular disease, and metabolic disorders. Micha and Mozaffarian (2010) emphasize that a diet rich in saturated fats and carbohydrates is a major cardiometabolic risk factor, while Ludwig (2002) highlights the role of simple carbohydrates in the development of insulin resistance and type 2 diabetes. Dietary fiber levels are low (approximately 1 g/100 g of dry matter), which is insufficient to ensure proper regulation of blood glucose and bowel movements. Fiber plays a crucial role in preventing cardiovascular and digestive diseases (Slavin, 2005). Low fiber intake could therefore contribute to the development of metabolic disorders and chronic conditions. Furthermore, mineral analyses reveal insufficient intake of calcium, magnesium, iron, potassium, and zinc. These potential deficiencies expose women to various health problems, including anemia (iron deficiency), immune disorders (zinc deficiency), and cardiovascular dysfunction (sodium/potassium imbalance). Although the measured sodium levels appear low, they may be underestimated, as they do not take into account total daily dietary intake. Excessive sodium consumption is strongly associated with elevated blood pressure (WHO, 2012). Furthermore, the consumption of processed fruit juices, often low in fiber, does not provide lasting satiety, unlike the consumption of whole fruit. This can promote overconsumption of calories and contribute to weight gain (Rolls and Keller, 2015). Overall, the nutritional profiles of the local fast-food restaurants studied reveal a predominance of energy-dense foods that are low in essential nutrients. These results align with those of Drewnowski and Popkin (2004), who emphasize that energy-dense foods are generally associated with low nutrient density, thus contributing to the increase in chronic diseases. Given this situation, adopting a balanced, cardioprotective, and blood pressure-lowering diet appears essential. This diet is characterized by increased consumption of fruits, vegetables, whole grains, and low-fat dairy products, combined with a reduction in salt intake (< 5 g/day), saturated fats, and added sugars. It also promotes adequate intake of potassium, calcium, and magnesium, as well as regular physical activity, including at least 30 minutes of walking daily (WHO, 2004). According to Bensaoud et al. (2025), this type of diet effectively contributes to reducing systolic and diastolic blood pressure, improving lipid profiles, and controlling body weight. It is therefore a key strategy in the primary prevention and management of hypertension. Finally, multisectoral interventions are needed to sustainably improve women's nutritional status. These include women's economic empowerment through micro-project funding, literacy programs, support for agricultural activities, and the implementation of nutrition education programs. These actions will promote healthier food choices and reduce the prevalence of non-communicable diseases (WHO, 2013; Okyere et al., 2023). Preventive nutritional solutions for public health diseases. In the context of preventing and managing cardiometabolic diseases such as hypertension, type 2 diabetes, obesity, and dyslipidemia, several recent nutritional recommendations emphasize reducing or eliminating certain foods associated with increased metabolic and cardiovascular risk. Current scientific data suggest that excessive consumption of alcohol, energy drinks, cola, caffeine, and ultra-processed

foods high in food additives contributes to elevated blood pressure, chronic inflammation, and metabolic disturbances (Nestel & Mori, 2024; Breeze et al., 2024). Therefore, it is recommended to avoid added sugars, excessive salt, traditional and local fast food, and commercially prepared broths. These products generally contain high amounts of sodium, saturated fatty acids, simple sugars and additives that may increase the risk of hypertension, diabetes and cardiovascular disease (Charles et al., 2024; Wang et al., 2023). Similarly, limiting the consumption of red meat, mutton, and bushmeat is advised due to their high saturated fat content and pro-inflammatory compounds that can contribute to increased LDL cholesterol and oxidative stress. Oils rich in oxidizable omega-6 fatty acids, particularly sunflower oil used at high temperatures, as well as certain fatty and sticky sauces made from okra, leaves, kplé, kope, or peanuts, should also be consumed with caution by individuals at risk of cardiometabolic disorders. Furthermore, peanuts, peanut-seed sauces, very sweet dried fruits, sweet bananas, excessive ripe plantains, high-fat dairy products, and smoked or dried fish can lead to excessive sodium, fat, or sugar intake, especially when consumed regularly and in large quantities. Recent studies on ultra-processed foods also show a significant association between these dietary habits and an increased risk of obesity, hypertension, and diabetes (Vitale et al., 2024; Guo et al., 2024). A preventive diet should prioritize minimally processed natural foods rich in fiber, vitamins, minerals, and antioxidants, including green vegetables, low-sugar fresh fruits, whole grains, and lean proteins. Plant-based dietary patterns are now emerging as effective approaches in the prevention of cardiovascular and metabolic diseases (Charles et al., 2024). African diets based on local products now constitute a sustainable nutritional approach to combat malnutrition, metabolic diseases, and food insecurity. In West Africa, several recent studies highlight the importance of promoting a diet based on traditional foods such as fresh fish, cassava, potatoes, yams, sweet potatoes, vegetables, eggplants, rice, tomato-based sauces, placali, and chicken. These foods provide essential nutrients that can improve the health of populations (Herforth et al., 2020). Fresh fish is an important source of high-quality protein, omega-3 fatty acids, calcium, zinc, and fat-soluble vitamins. Regular fish consumption contributes to the prevention of cardiovascular disease and healthy cognitive development (FAO & WHO, 2023). In Côte d'Ivoire, fresh fish dishes served with attiéké or placali play a significant role in the daily diet and cultural practices of the population. Tubers such as cassava, yam, potato, and sweet potato are major energy foods in African countries. Cassava is particularly valued for its availability and its role in food security. According to Kobenan et al. (2023), cassava is an essential food resource in Côte d'Ivoire and makes a significant contribution to the diets of rural and urban households. Similarly, Amoa et al. (2023) show that the processing of cassava into derivative products such as placali contributes not only to family nutrition but also to the economic empowerment of Ivorian women. Clear tomato-based sauces, vegetables, and eggplants also play an important nutritional role due to their richness in dietary fiber, vitamins, and antioxidant compounds. A diet rich in

vegetables helps reduce the risk of obesity, type 2 diabetes, and high blood pressure (Willett et al., 2019). African leafy greens and eggplants are particularly rich in micronutrients necessary for a healthy immune system. Rice and chicken are also essential components of balanced diets. Rice provides a significant source of energy, while chicken provides lean protein and amino acids crucial for growth and the maintenance of body tissues. When combined with vegetables and low-fat sauces, these foods contribute to a diverse and balanced diet. Furthermore, many authors now recommend promoting local African foods to strengthen food sovereignty and reduce dependence on imported products. In Côte d'Ivoire, authorities are increasingly encouraging the consumption of local staple foods such as cassava, yams, rice, and vegetables as part of food security policies. Thus, diets based on fresh fish, tubers, vegetables, and poultry represent a sustainable nutritional strategy capable of improving public health and preserving traditional African eating habits.

Conclusion

This study highlights a concerning increase in overweight, obesity, hypertension, type 2 diabetes, cardiovascular disease, and kidney failure among women of reproductive age in Bingerville.

Nutritional interventions improved body mass index, blood glucose levels, LDL cholesterol levels, blood pressure, and kidney failure, indicating a strong link between diet, obesity, type 2 diabetes, cardiovascular disease, kidney failure, and hypertension. By prioritizing a balanced diet based on fresh fish, cassava, potatoes, yams, sweet potatoes, clear tomato-based sauces and vegetables, as well as placali, eggplant, rice, and chicken, the population can benefit from a diverse nutritional intake tailored to their physiological needs. Combined with appropriate nutrition education, this diet contributes to the adoption of good eating habits and improved nutritional status. Such an approach would help reduce the prevalence of public health diseases such as malnutrition, anemia, obesity, type 2 diabetes, and hypertension. Promoting nutritious local foods also represents a sustainable strategy for improving food security and community health. Therefore, integrating nutrition education into local food practices is a key lever for preventing non-communicable and nutritional diseases.

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