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Lipid Profile Disparities Among Elderly Individuals in the Western Region of Cameroon.

By

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Abstract

Objective: *This study analyzes lipid profile variations across different localities in the Western Region of Cameroon, focusing on sex and age differences. It assesses the prevalence of hypotriglyceridemia, normal triglyceride levels, hypertriglyceridemia, hypocholesterolemia, normal cholesterol levels, and hypercholesterolemia among individuals aged 50 years and above in Bafang, Bafoussam, Baham, Dschang, and Bandjoun.*

Methodology: *A cross-sectional study was conducted among subjects aged 50 years and older. Serum concentrations of cholesterol and triglycerides were measured, and participants were categorized by age and sex. Statistical analyses, including descriptive statistics and Chi-square tests, were performed to assess lipid profile variations across different localities.*

Results: *Men exhibited higher rates of hypotriglyceridemia and hypertriglyceridemia, particularly in Bandjoun and Bafang, while women, especially those aged 50-59 years, showed higher rates of hypercholesterolemia, notably in Dschang and Baham. In Dschang, 82.6% of women aged 50-59 years had normal triglyceride levels, compared to only 17.4% of men. Moreover, hypercholesterolemia prevalence increased with age among women.*

Conclusion : *These findings highlight the need for targeted public health interventions to address lipid-related disorders, particularly in high-risk groups such as younger women prone to hypercholesterolemia and men with hypertriglyceridemia. Further research is necessary to explore the underlying causes of these demographic and regional disparities.*

Keywords *: Lipid profile, Hypotriglyceridemia, Hypertriglyceridemia, Hypocholesterolemia, Hypercholesterolemia, Age, Sex.*

INTRODUCTION

Lipid profile variations are crucial biomarkers of cardiovascular health, influencing the risk of cardiovascular diseases (**CVDs**), which remain a leading cause of morbidity and mortality worldwide. Abnormal lipid levels, such as hypercholesterolemia and hypertriglyceridemia, are well-documented risk factors for atherosclerosis, hypertension, and metabolic syndrome (**Nordestgaard et *al.*, 2014**). In sub-Saharan Africa, and particularly in Cameroon, the epidemiological transition is marked by a rising prevalence of non-communicable diseases (NCDs), including dyslipidemia, due to changing dietary habits, urbanization, and aging populations (**Noubiap et *al.*, 2018).**

Several studies have highlighted sex-based differences in lipid metabolism. Men often exhibit lower HDL cholesterol levels and higher triglycerides, while women tend to have higher total cholesterol levels, especially after menopause due to

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hormonal shifts (**Choudhury & Rabinovitch, 2019**). The role of estrogen in lipid regulation is well established, as it promotes HDL synthesis and reduces LDL cholesterol; however, postmenopausal women experience an increase in total cholesterol and LDL levels, which contributes to their elevated cardiovascular risk (**Mendelsohn & Karas, 1999).**

While previous research has investigated lipid profile variations in African populations (**Adediran et *al*., 2013**; **Mbunkah et *al*., 2020),** few studies have examined intra-country disparities, particularly in Cameroon. Given the country's demographic diversity and regional socio-economic differences, understanding lipid profile variations by age, sex, and locality is essential for targeted prevention and treatment strategies.

This study aims to assess lipid profile variations among individuals aged 50 years and above in five major localities of the Western Region of Cameroon: Bafang, Bafoussam, Baham, Dschang, and Bandjoun. By analyzing differences in triglyceride and cholesterol levels by sex and age, this research contributes to a better understanding of lipid-related health disparities and provides essential data for public health planning in Cameroon.

Methodology

Study Design and Population

This cross-sectional analytical study was conducted in five localities of the West Region of Cameroon (**Bafang, Bafoussam, Baham, Bandjoun, and Dschang**) among **768 individuals aged 50 years and older**. Participants were categorized into four age groups: **50–59 years, 60–69 years, 70–79 years, and ≥80 years**.

Muscle Profile and Biochemical Measurements

The assessed biochemical parameters included **serum cholesterol and triglycerides**. Blood samples were collected from participants in each locality under standardized conditions and analyzed in the **clinical biology laboratories of the Regional Hospital of Bafoussam** using validated techniques.

Data Collection and Statistical Analysis

- **Data Entry and Coding**: The collected data were coded and entered into **Epi Info 7.1.3.0**.
- **Statistical Software**: Analyses were performed using **Epi Info 7.1.3.0, SPSS 18, Excel 2016, and Xlstat 2014**.
- **Descriptive Statistics**: The prevalence of **metabolic anomalies** (hypocholesterolemia, normal cholesterol, hypercholesterolemia, hypotriglyceridemia, normal triglyceridemia, and hypertriglyceridemia) was calculated for each **age group and sex** across the five localities.
- **Correlation and Association Analyses**:
  - Correlation tests were conducted to examine **associations between biochemical parameters and aging**.
  - **Pivot tables** were used to summarize trends in metabolic anomalies across age groups and locations.

Classification of Results

Results were interpreted based on **established normality thresholds** for serum lipid parameters. Participants were classified into the following categories:

- **Cholesterol Levels**: Hypocholesterolemia, normal cholesterol, hypercholesterolemia.
- **Triglyceride Levels**: Hypotriglyceridemia, normal triglyceridemia, hypertriglyceridemia.

Results

The total population comprised 768 participants, with a majority of women (451, or 58.7%) compared to men (317, or 41.3%), reflecting global trends observed in other aging studies. The age distribution reveals an aging population, with a significant proportion of individuals aged 60 and above. Furthermore, the majority of participants fall within the age groups of 50-59 years (167 individuals) and 60-69 years (121 individuals), which is crucial for aging and health studies. The data were collected from several locations, including Bafang, Bafoussam, Baham, Bandjoun, and Dschang, with a higher concentration of elderly individuals in Dschang (85) and Bafoussam (83), while Bandjoun has a relatively lower proportion (67). These results highlight geographic variations in health characteristics and risk factors. They emphasize the importance of considering local disparities in the allocation of healthcare resources.

Table 1. Distribution of the Study Population by Sex, Age, and Localities

Localités	Villages	Tranches d'âge								Total
		50-59		60-69		70-79		≥80		
		F	M	F	M	F	M	F	M	
Bafang	Bana	15	4	22	8	10	3	2	5	69
	Banka	12	21	8	17	2	9	1	3	73
Bafoussam	Kamkop	20	15	14	12	11	11	0	0	83
	Tamdja	5	13	12	12	4	11	7	7	71
Baham	Demgo	25	17	11	6	7	3	5		74
	Medjo	18	9	24	8	6	9	4	2	80

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Bandjoun	Semtôh	8	17	6	19	8	7		2	67
	Tsélâh	17	13	12	14	9	9	3	1	78
Dschang	Fotetsa	25	7	23	5	12	2	9	2	85
	Johnny Baleng	22	5	24	5	23	3	5	1	88
										768

Analysis of the Lipid Profile by Locality, Sex, and Age (Table II)

The analysis of Table XXIII on the lipid profile in the study localities based on sex and age allows for the following observations for each category across the different localities:

Hypotriglyceridemia

Hypotriglyceridemia varies depending on locality and age:

- Bafang: Among women aged 50-59, 8.7% (2/23) have hypotriglyceridemia, while for men in the same age group, the rate is 30.4% (7/23).
- Bafoussam: Women aged 60-69 show 0% hypotriglyceridemia (0/22), whereas men in the same group show 13.6% (3/22).
- Baham: Among women aged 50-59, 6.5% (2/31) exhibit hypotriglyceridemia, and for men, the rate is 27.3% (6/22).

These results show that men tend to have higher rates of hypotriglyceridemia in most localities and age groups.

Normal Triglyceride Levels

Normal triglycerides constitute the majority of values across all localities and age groups, but they vary by sex:

- Dschang: Among women aged 50-59, 82.6% (38/46) have normal triglycerides, while only 17.4% (8/46) of men in the same age group are within normal range.
- Baham: In the 50-59 age group, 67.4% of women (31/46) and 34.8% of men (16/46) have normal values.

Normal triglyceride levels are more frequent in women, particularly in Dschang and Baham.

Hypertriglyceridemia

Hypertriglyceridemia appears more in certain age groups but is generally less frequent:

- Bandjoun: Men aged 60-69 show a 35.7% (10/28) rate of hypertriglyceridemia, higher than in other age groups and localities.
- Dschang: Among women aged 70-79, 25% (9/36) are hypertriglyceridemic, which is notable compared to men in the same age group (only 2.8%, 1/36).

Hypocholesterolemia

Hypocholesterolemia is rare and appears in only a few groups:

- Bafang: Among men aged 70-79, 13% (3/23) have hypocholesterolemia, while this rate is zero among women in the same age group.

Normal Cholesterol Levels

Normal cholesterol levels are more frequent in certain localities:

- Dschang: Among women aged 50-59, 65.2% (15/23) have normal cholesterol levels, compared to 26.1% among men (6/23) in the same age group.

Hypercholesterolemia

Hypercholesterolemia is particularly high among women in several localities:

- Dschang: Among women aged 50-59, the rate is high at 69.6% (32/46). Additionally, 60-69-year-old women show 70.83% (34/48), and women aged 70-79 have 71.42% (25/35). Finally, women aged 80 and above reach a high rate of 75.58% (12/17), highlighting the need for increased surveillance of this population.
- Baham: Among women aged 50-59, 58.7% (27/46) exhibit hypercholesterolemia, suggesting a notable prevalence of this condition in this age group.

Summary of Key Findings

In general, the table reveals the following trends:

- Men tend to have higher rates of hypotriglyceridemia, while normal triglyceride and cholesterol levels are more frequent in women.
- Hypertriglyceridemia is particularly notable among men in certain localities, notably in Bandjoun and Dschang.
- Hypercholesterolemia is higher among women in Dschang and Baham, especially in the younger age groups (50-59 years and 60-69 years), which may indicate specific risks for lipid disorders in these groups.

Tableau II. Bilan lipidique dans les localités d'étude en fonction du sexe et de l'âge

Classes du paramètre du bilan lipidique	Localités	Tranches d'âge							
		50-59		60-69		70-79		≥80	
		F	M	F	M	F	M	F	M
Hypotriglycéridémie	Bafang	2	7	2	5	1	4	1	1
M < 0,60 g /l	Bafoussam	2	6	0	3	1	5	0	1

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F < 0,40 g/l	Baham	2	6	3	2	0	2	3	0
	Bandjoun	2	5	1	5	1	1	2	1
	Dschang	1	3	1	2	2	2	0	0
Normale M 0,60 – 1,65 g /l F 0,40 – 1,40 g/l	Bafang	22	16	22	19	10	6	1	6
	Bafoussam	20	20	22	18	13	13	7	5
	Baham	31	16	28	10	12	9	5	2
	Bandjoun	21	23	16	18	10	15	1	1
	Dschang	38	8	38	7	24	2	14	3
Hypertriglycéridémie M > 1,65 g /l F > 1,40 g/l	Bafang	3	2	6	1	1	2	1	1
	Bafoussam	3	2	4	3	1	4	0	1
	Baham	10	4	4	2	1	1	1	0
	Bandjoun	2	2	1	10	6	0	0	1
	Dschang	8	1	8	1	9	1	0	0
Hypocholestérolémie <2,00 g/l	Bafang	2	2	2	2	0	3	0	0
	Bafoussam	1	3	0	3	1	1	0	0
	Baham	3	1	2	3	0	1	3	0
	Bandjoun	2	0	1	1	0	0	3	0
Normale 2,00 g/l	Bafang	5	6	7	8	2	3	1	5
	Bafoussam	8	6	9	5	6	1	3	3
	Baham	13	9	7	3	4	3	1	0
	Bandjoun	7	8	4	17	8	6	0	1
	Dschang	15	6	13	3	10	2	2	0
Hypercholestérolémie > 2,00 g/l	Bafang	20	17	21	15	10	6	2	3
	Bafoussam	16	19	17	16	8	20	4	4
	Baham	27	16	26	8	9	8	5	2
	Bandjoun	16	22	13	15	9	10	0	2
	Dschang	32	6	34	7	25	3	12	3

Discussion

The findings of this study highlight significant sex- and age-related differences in lipid profiles among elderly individuals in the Western Region of Cameroon. The results align with previous studies that have reported sex-related disparities in lipid metabolism and age-associated dyslipidemia (**Jacobson et *al.*, 2015**).

Sex Differences in Lipid Profiles

Our study confirms that men exhibit higher rates of hypotriglyceridemia, whereas women, particularly in the younger age groups (50-59 years and 60-69 years), show a higher prevalence of hypercholesterolemia. This observation is in line with studies conducted in other African populations, where lower triglyceride levels in men have been attributed to a more efficient lipid-oxidative metabolism (**Adediran et *al.*, 2013).**

Similarly, the higher prevalence of hypercholesterolemia in women is consistent with findings from studies in Nigeria and Ghana, where postmenopausal women exhibited significantly elevated total cholesterol and LDL levels (**Adebayo et *al.*, 2020**; **Amoah et *al.*, 2002**). The decline in estrogen levels after menopause contributes to these lipid alterations by increasing LDL cholesterol and decreasing HDL cholesterol, thereby amplifying cardiovascular risk (**Mendelsohn & Karas, 1999**).

Regional Variations in Lipid Profiles

The significant differences observed across Bafang, Bafoussam, Baham, Dschang, and Bandjoun suggest that environmental, dietary, and lifestyle factors influence lipid metabolism. Previous studies have demonstrated that urbanization and dietary shifts towards processed foods high in saturated fats and refined sugars contribute to rising hyperlipidemia rates in Africa (**Mbunkah et *al.*, 2020).**

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For example, the high prevalence of hypertriglyceridemia among men in Bandjoun and Bafang may reflect dietary patterns rich in saturated fats and carbohydrates, as observed in studies conducted in urban Cameroon **(Noubiap et *al.*, 2018**). Conversely, Dschang's lower triglyceride levels may be due to a diet richer in fiber and traditional plant-based foods, which are known to regulate lipid metabolism (**Ekouevi et *al.*, 2017).**

Implications for Public Health Interventions

The observed differences in lipid profiles reinforce the need for localized and sex-specific public health interventions. Given the high rates of hypercholesterolemia in younger women, early screening and lifestyle interventions should be prioritized. This aligns with global recommendations advocating lipid profile monitoring in women over 50 years to reduce cardiovascular risk (**Grundy et *al.*, 2019**).

Additionally, the high prevalence of hypertriglyceridemia among men highlights the necessity of dietary and physical activity programs targeting this group. Community-based interventions promoting healthier diets, increased physical activity, and smoking cessation have proven effective in reducing cardiovascular risk in African populations (**Ekoru et *al.*, 2018**).

Moreover, the regional variations in lipid disorders suggest that health policies in Cameroon should adopt a decentralized approach, considering local dietary habits and socioeconomic disparities rather than applying uniform national guidelines.

Study Limitations and Future Research

Despite its strengths, this study has limitations. The cross-sectional design prevents causal inferences, and important factors such as dietary intake, genetic predispositions, and socioeconomic status were not assessed. Future research should incorporate longitudinal studies to establish causality and explore additional metabolic markers such as HDL and LDL cholesterol, which play a key role in cardiovascular health.

Additionally, future studies should investigate genetic polymorphisms associated with lipid metabolism in African populations. Previous research has identified specific genetic variants that contribute to lipid profile variations in African cohorts (**Rotimi et *al.*, 2004)**, which could further explain regional disparities observed in Cameroon.

Conclusion

This study highlights significant sex- and age-based disparities in lipid profiles among elderly individuals in the Western Region of Cameroon, with men showing higher hypotriglyceridemia rates and women exhibiting elevated hypercholesterolemia, particularly in the 50-59 age group. These findings underscore the importance of tailored public health interventions, considering both biological factors and regional disparities to reduce cardiovascular risk in high-risk populations. Addressing these disparities through targeted screening, lifestyle interventions, and policy adjustments could significantly contribute to lowering the burden of cardiovascular diseases in Cameroon.

Recommendations

Based on the findings of this study, the following recommendations are proposed to improve lipid profile management and reduce cardiovascular risk among elderly individuals in the Western Region of Cameroon:

1. **Early Screening and Preventive Measures**
- Implement **routine lipid profile screenings** for individuals over 50 years, with a focus on early detection of hypercholesterolemia in women and hypertriglyceridemia in men.
- Integrate **cardiovascular risk assessments** into primary healthcare services to identify high-risk individuals and provide early intervention.

2. **Sex-Specific Public Health Interventions**
- **For women:** Develop awareness programs emphasizing the impact of menopause on lipid metabolism and cardiovascular health, promoting lifestyle changes such as increased physical activity and healthier dietary habits.
- **For men:** Implement nutritional education programs to **reduce saturated fat intake** and encourage diets rich in fiber and unsaturated fats to lower triglyceride levels.

3. **Community-Based Nutritional and Lifestyle Programs**
- Promote **healthier traditional diets** that emphasize plant-based foods, whole grains, and lean proteins while reducing processed foods and added sugars.
- Encourage **physical activity programs** at the community level, such as walking groups, aerobics, and tailored exercise regimens for elderly individuals.
- Strengthen public health messaging on **smoking cessation and alcohol reduction**, as both factors significantly impact lipid metabolism and cardiovascular risk.

4. **Decentralized and Culturally Adapted Health Policies**
- Develop **localized public health strategies** that consider regional variations in dietary habits and socioeconomic factors.
- Work with **community leaders and local health organizations** to implement culturally relevant interventions that address specific dietary practices contributing to dyslipidemia.
- Support government policies aimed at **reducing the availability of unhealthy processed foods** while promoting locally sourced nutritious foods.

5. **Further Research and Policy Development**
- Conduct **longitudinal studies** to establish causality between lipid profile changes, dietary habits, and aging in the Cameroonian population.

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- Explore **genetic predispositions** to lipid metabolism variations among different ethnic groups in Cameroon.
- Encourage **multidisciplinary collaborations** between healthcare providers, researchers, and policymakers to develop **evidence-based guidelines** for lipid management in aging populations.

Declarations

Ethical approval and consent to participate: The study was approved by the Ethics Committee of the Catholic University of Central Africa. All participants signed an informed consent form.

Consent for publication: Not applicable.

Availability of data: The datasets used and/or analyzed during the study are available upon request from the corresponding author.

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