

# Prevalence of Cardiovascular Risk Factors among Professional Heavy Goods Vehicle Drivers in the City of Ouagadougou: A Study Conducted during Medical Examinations

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## Abstract

**Introduction:** Cardiovascular diseases are the leading cause of death worldwide. Although cardiovascular risk has been the subject of numerous studies around the world, few studies have focused on cardiovascular risk in the workplace in Burkina Faso. **Objective:** To assess the prevalence of cardiovascular risk factors among professional heavy goods vehicle drivers in the city of Ouagadougou. **Methods:** This was a cross-sectional descriptive study with prospective recruitment, conducted from January 2022 to October 2022 during various medical examinations of heavy goods vehicle drivers at the occupational health services of the Ouagadougou Occupational Health Office (OST). Data were collected using questionnaires and analyzed using Epi Info 7 version 7.2.4.0 and Excel 2019 software. **Results:** A total of 322 professional heavy goods vehicle drivers were included in the study. All drivers were male. The mean age was 36 years  $\pm$  8.26, with a range of 19 to 56 years. Primary school education was the most common, at 36.65%. Cardiovascular risk factors identified were sedentary lifestyle (55.28%), hypercholesterolemia (35.71%), high blood pressure (33.23%), alcoholism (31.37%), smoking (29.50%), metabolic syndrome (18.94%), obesity (9.63%), and diabetes (4.04%). Being over 40 years of age was significantly associated with high blood pressure ( $p = 0.01$ ) and a sedentary lifestyle ( $p = 0.01$ ). **Conclusion:** A high prevalence of cardiovascular risk factors was observed among the truck drivers studied. Therefore, the im-

plementation of appropriate cardiovascular disease prevention strategies in the workplace, particularly in the transport sector, is essential.

## Keywords

Cardiovascular Risk Factors, Heavy Goods Vehicle Drivers, Medical Examination, Occupational Health Office (OST), Ouagadougou (Burkina Faso)

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## 1. Introduction

Cardiovascular diseases are the leading cause of death worldwide [1]. By 2030, the World Health Organization (WHO) estimates that nearly 23.6 million people will die from cardiovascular disease. According to projections, these diseases are expected to remain the leading causes of death [2]. Cardiovascular diseases are the leading cause of morbidity and mortality in the United States, accounting for one in four deaths [3].

In Africa, the burden of cardiovascular diseases is increasing so rapidly that they have become a public health problem [4].

Cardiovascular diseases constitute one of the three causes of medical evacuation in Burkina Faso, according to the Burkina Faso Society of Cardiology (SO.CAR.B), and the prevalence of cardiometabolic risks was high in the workplace in Burkina Faso at 29.9% according to a study published in 2017 [5]. Cardiovascular diseases generally result from a combination of several risk factors, such as height blood pressure (HBP), diabetes, smoking, dyslipidemia, obesity, excessive alcohol consumption, and physical inactivity [2].

Over the past ten years, the landscape of cardiovascular risks related to work has changed considerably with the increase in psychological and organizational constraints, under the pressure of economic issues and due to the intensification of work [6]. Discussing the impact of new work organization methods on health systematically brings to mind psychosocial risks and musculoskeletal disorders, and more rarely cardiovascular risks (CVR).

Compared to the general population, drivers, due to their working conditions and lifestyle, have increased risk factors for cardiovascular diseases [7].

The transport sector, a key economic driver, is a vital link in the development chain of Burkina Faso, a landlocked country. The development of this sector depends on the well-being of its stakeholders, including drivers.

In Burkina Faso, few studies have focused on cardiovascular risks in the workplace, particularly among heavy goods vehicle drivers.

This study aims to determine the prevalence of cardiovascular risk factors (CVRF) among heavy goods vehicle drivers in the city of Ouagadougou.

## 2. Materials and Methods

### 2.1. Study Framework and Population

This was a cross-sectional, descriptive study with prospective recruitment, con-

ducted from January 2022 to October 2022.

The study was conducted in the occupational health services of the medical zones and the clinic of the occupational health office (OST) of the city of Ouagadougou.

The study population consisted of professional heavy goods vehicle drivers who had been regularly residing in the city of Ouagadougou for at least one year, aged 18 years and over, who had undergone a medical examination and had a medical file with a summary of additional examinations.

The following were not included in the study: drivers of light vehicles, professional drivers of heavy vehicles not regularly residing in the city of Ouagadougou or not having a medical file, and drivers who indicated a refusal.

## 2.2. Data Collection and Analysis

Data collection was carried out using an anonymous questionnaire, inspired by the WHO STEPS questionnaire and administered by a doctor after a clinical examination.

The questionnaire was administered in French or the local language (*Mooré* and *Dioula*) depending on the participant's understanding, using vocabulary adapted to the study population, including:

- socio-demographic and professional data: gender, age, level of education, job position and function;
- Clinical and paraclinical data: family history, smoking, physical activity, weight, height blood pressure (HBP), waist circumference, complete blood count, fasting blood glucose, serum creatinine, liver transaminases and lipid profile.

In this study, the following cardiovascular risk factors (CVRF) were considered:

- Age and sex: Male  $\geq 45$  years (WHO criteria).
- High blood pressure (HBP): systolic-diastolic blood pressure greater than or equal to 140/90 mmHg.
- Presence of a family history of cardiovascular disease (high blood pressure, heart disease, diabetes, stroke).
- Diabetes: fasting blood glucose greater than or equal to 7 mmol/l checked twice, according to the criteria proposed in 2006 by the WHO.
- Dyslipidemia: Total cholesterol  $\geq 5$  mmol/l, LDL cholesterol  $\geq 4.1$  mmol/l, HDL cholesterol  $\leq 1$  mmol/l and Triglycerides  $> 1.7$  mmol/l.
- Obesity: body mass index greater than or equal to 30 kg/m<sup>2</sup>.
- Smoking: active or quit less than 3 years ago.
- Daily alcohol consumption: 1 to 2 glasses/day ( $\geq 20$  g).
- Sedentary lifestyle: low energy expenditure in a sitting or lying position ( $\leq 1.6$  metabolic equivalent).
- Unbalanced diet: high in saturated fatty acids, sugar and sodium, low in potassium.
- Metabolic syndrome: waist circumference greater than 94 cm in men and 80 cm in women, triglycerides greater than or equal to 1.5 g/l (1.7 mmol/l), HDL-

cholesterol less than 0.4 g/l (1.03 mmol/l) in men, blood pressure greater than or equal to 130/85 mm Hg, fasting blood glucose greater than or equal to 1 g/l (5.6 mmol/l) according to the criteria of the International Diabetes Federation (IDF) 2009.

The sample size was calculated using the SCHWARTZ formula [8] assuming a 95% confidence level, a 5% margin of error and a prevalence of arterial hypertension in Burkina Faso of 29.6% [9].

The investigation was conducted in several stages:

First, the blood sampling stage: blood samples for analysis were taken from the inside of the elbow of subjects who had been fasting for at least 8 hours. This was performed by an accredited laboratory 48 hours before the medical examination. All results were double-checked.

Next, came the anthropometric measurements, taken before the physical examination: blood pressure was measured using an automatic sphygmomanometer (OMRON) with a suitable armband on the subject at rest, having been seated for 5 - 10 minutes. Three successive readings were taken, and the average of the last two readings defined the blood pressure according to the 2024 European Society of Cardiology guidelines. Drivers with known hypertension who were receiving treatment were considered as such. Weight was obtained using calibrated mechanical bathroom scales with a maximum capacity of 150 kg and an accuracy of 100 g.

Body mass index was interpreted according to WHO recommendations. Waist circumference, measured midway between the iliac crest and the last rib, was measured using a non-stretchable measuring tape.

Finally, there is the questionnaire stage where the doctor completes the questionnaire based on the interview, anthropometric measurements, and medical history, after having performed a physical examination.

The drivers' medical records were reviewed to identify other medical histories.

The survey involved 365 professional drivers. Among them, 6 refused to participate in the study and 37 were excluded for incomplete files.

Data entry and analysis were performed using Epi Info 7 software, version 7.2.4.0. Pearson's chi-square test was used to analyze the relationship between qualitative variables with a significance threshold of  $p < 0.05$ . The graphs were created using Excel software version 2019.

The study began after approval from an ethics committee. Informed, free, and voluntary consent was obtained from all participants. Anonymity and data confidentiality were maintained.

### 3. Results

In total, 322 out of 365 truck drivers were included in our study, representing a participation rate of 88.22.

#### 3.1. Sociodemographic and Professional Characteristics of Drivers

All drivers were male. The average age of the drivers was 36 years  $\pm$  8.26, with a

range from 19 to 56 years. The 30 - 40 age group was the most represented at 42.86%, and 69.25% of the drivers were under 40 years old.

According to job category, tanker truck drivers were the most represented. Married drivers accounted for 75.78%. Primary school education was the most common, at 36.65%. Those residing in urban areas represented 95.96%. Vegetable consumption ( $\geq 3$  portions of 80 g) was regular in 77.02% of cases, and fruit consumption ( $\geq 3$  portions of 80 g) in 40.06%.

Sociodemographic and professional characteristics are represented in **Table 1**.

**Table 1.** Distribution of heavy goods vehicle drivers according to socio-demographic and professional characteristics (n = 322).

Characteristics	Effective	Frequency (%)
<b>Sex</b>		
Female	0	0
Male	322	100
<b>Workstation</b>		
Dump trailer truck	33	10.25
Tanker truck	228	70.81
public transport bus	61	18.94
<b>Seniority</b>		
Less than 10 years	215	66.77
More than 10 years	107	33.23
<b>Age</b>		
Under 20 years old	6	1.86
20 - 30 years old	79	24.53
30 - 40 years old	138	42.86
40 - 50 years old	89	27.64
Over 50 years	10	3.11
<b>Marital status</b>		
Bachelor	77	23.91
Divorce	1	0.31
Married	244	75.78
<b>Level of study</b>		
No official instructions	83	25.78
Primary	118	36.65
Secondary	115	35.71
Higher	6	1.86
<b>Place of residence</b>		
Rural (peri-urban)	13	4.04
Urban	309	95.96

**Continued****Eating habits**

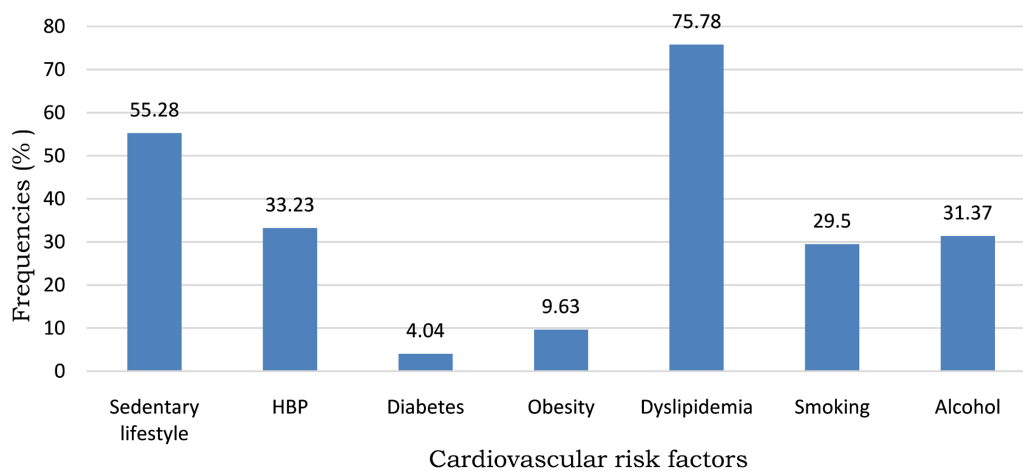
Regular consumption of fruit	No	193	59.94
	Yes	129	40.06
Regular consumption of vegetables	No	74	22.98
	Yes	248	77.02

**3.2. Cardiovascular Risk Factors**

The prevalence of sedentary lifestyles was 55.28%. Active smokers represented 29.50%. Regular alcohol consumption was 31.37%. Obesity represented 9.63%. The prevalence of high blood pressure (HBP) was 33.23%.

The identified family history included high blood pressure (13.81%), heart disease (10.47%), diabetes (6.01%), and stroke (4.96%). Dyslipidemia was present in 75.78% of cases, with total hypercholesterolemia in 35.71%, hyperLDL cholesterol in 33.85%, hypoHDL cholesterol in 23.29%, and hypertriglyceridemia in 57.45%. The prevalence of diabetes was 4.04%. Abdominal obesity was present in 22.98% of cases, and metabolic syndrome in 18.94%.

Dyslipidemia, sedentary lifestyle and high blood pressure were the main risk factors found, as shown in **Figure 1**.



**Figure 1.** Prevalence of cardiovascular risk factors among heavy goods vehicle drivers.

**3.3. Analysis of the Association between Cardiovascular Risk Factors and Sociodemographic and Professional Characteristics of Drivers**

Statistical analysis revealed that age and length of driving experience were significantly associated with several risk factors.

Drivers aged 40 and over had a very high probability of having hypertension ( $p = 0.01$ ) and a sedentary lifestyle ( $p = 0.01$ ).

Those with more than 10 years of driving experience were more likely to have hypertension ( $p = 0.02$ ) and to be tobacco users ( $p = 0.04$ ).

The results of the various statistical associations are shown in **Table 2(a)** and **Table 2(b)**.

**Table 2.** Analysis of the association between cardiovascular risk factors and sociodemographic and professional characteristics of drivers.

(a)								
Factors	Cardiovascular risk factors							
	HBP		Sedentary lifestyle		Dyslipidemia			
	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p		
<b>Age</b>								
<40 years old	8.62	1	0.16	1	1.72	1		
≥40 years old	[5.08 - 14.63]	0.01	[0.1 - 0.2]	0.01	[0.97 - 3.05]	0.059		
<b>Seniority</b>								
<10 years old	0.22	1	3.98	1	0.84	1		
≥10 years old	[0.06 - 0.8]	0.02	[0.5 - 31.13]	0.16	[0.7 - 1.4]	0.45		
<b>Level of study</b>								
Before secondary school	0.55	1	0.95	1	2.25	1		
After secondary school	[0.26 - 1.16]	0.12	[0.55 - 1.65]	0.88	[1.96 - 2.34]	0.26		
(b)								
Factors	Cardiovascular risk factors							
	Smoking		Alcohol		Obesity		Diabetes	
	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p	OR (95%CI)	p
<b>Age</b>								
<40 years old	1.85	1	0.89	1	2.27	1	3.2	1
≥40 years old	[1.12 - 3.01]	0.12	[0.54 - 1.46]	0.21	[1.97 - 2.25]	0.28	[1.02 - 10.06]	0.09
<b>Seniority</b>								
<10 years old	0.22	1	1.98	1	0.84	1	1.16	1
≥10 years old	[0.06 - 0.8]	0.04	[1.5 - 3.13]	0.35	[0.8 - 1.4]	0.42	[0.28 - 2.13]	0.12
<b>Level of study</b>								
Before secondary school	3.62	1	1.54	1	2.51	1	2.34	1
After secondary school	[4.26 - 7.16]	0.31	[1.55 - 4.25]	0.07	[0.62 - 7.36]	0.15	[0.61 - 3.11]	0.38

OR: odds ratio; CI: Confidence interval.

## 4. Discussion

### 4.1. Sociodemographic and Professional Characteristics of Drivers

All the drivers in our study were male. In Burkina Faso, the road transport profession, as everywhere in the world, is almost exclusively occupied by men [10]. The same observation was made by Sanogo [11] in his study on heavy goods vehicle drivers in Mali, by Zoma [12] in his study on road transport in the West

African Economic and Monetary Union (WAEMU) zone in Burkina Faso and Konsebo [13] on tanker truck drivers in Burkina Faso and A.I.N Arnaud *et al.* [14] among freight truck drivers in Ivory Coast.

This situation stems from popular belief that men are more skilled at driving than women. Furthermore, the itinerant nature of the job makes it difficult for women to pursue it. This corroborates the findings of scientific research showing that driving is perceived as a masculine activity; men's driving ability is thus interpreted as innate [15]. This tendency is also thought to be related to the arduous nature of the work.

The average age of drivers in our study was 36 years, with a range from 19 to 56 years. This result is similar to that of Millogo's study [9] in the urban area of Ouagadougou, Burkina Faso, which found an average of 36.10 years, and lower than that of Konsebo's study [13] in Burkina Faso, which was 38 years, and to that of A.I.N. Arnaud *et al.* [14] which was 39.2 years. This difference can be explained by the current trend towards recruiting younger drivers.

Our study focused on heavy goods vehicle drivers who participate in various medical examinations. These include tanker truck drivers (70.81%), public transport bus drivers (18.94%) and tipper truck drivers (10.25%).

Other heavy goods vehicle drivers (trucks transporting timber, coal, gravel, goods, etc.) are not organized to join the OST to benefit from occupational health services, including medical check-ups. This presents a challenge that needs to be addressed.

Married drivers represented 75.78% of the workforce. This result is comparable to the national average for the marital status of the Burkinabe population, which is 77.2% for the majority age group in our study, according to the results of the fifth general census of population and housing in Burkina Faso (5th RGPH) [16]. The workplace study in Burkina Faso [5] found 80.2%. This can be explained by the fact that in our societies, reaching maturity is accompanied by a desire to take on social responsibilities, particularly starting a family. The same observation was made by Zoma [12].

Primary education was the most represented level of education at 36.65%. This result is similar to that of Konsebo [13] who found in his study that 36% of drivers had a primary education level.

The education level of drivers is lower than the primary school attendance rate, which is 45.6% according to the results of the 5th General Population and Housing Census [16]. In the transport sector, educational attainment is not a requirement for obtaining a driver's license according to Law No. 005-2018/AN establishing the rules relating to the establishment, issuance and validity of driver's licenses in Burkina Faso, but it would be an advantage.

## 4.2. Cardiovascular Risk Factors for Drivers

In our study, most drivers travel internationally, far from home. This situation makes it difficult to maintain a balanced diet. Vegetable consumption was regular

in 77.02% of cases, and fruit consumption in 40.06%.

Burkina Faso's 2016-2020 Integrated Strategic Plan for the Control of Non-Communicable Diseases [17] showed that nearly 95% of the population consumed fewer than five portions of fruit and/or vegetables per day. The availability of fruit and vegetables, which depends on the season and especially on cost, sometimes makes them inaccessible to the general population. The difficulty of quantifying fruit and vegetable consumption using conventional units of measurement prevented comparison with other studies.

The prevalence of smoking was 29.50%. This result differs from the results of Sanogo [11] and Konsebo [13], who reported 76% and 20.7% respectively in their studies.

This prevalence is likely related to the arduous nature of the work, on the one hand, and to factors such as stress while driving and the possibility of smoking in the cabin without disturbing a passenger, on board.

The prevalence of high blood pressure was 33.23%. A similar trend was reported by Ilboudo [5], who found a prevalence of 31.7%. However, the study by Millogo [9] found a prevalence of 29% and 24.8% in urban areas, according to the Integrated Strategic Plan for the Control of Non-Communicable Diseases 2016-2020 in Burkina Faso [17].

This difference in prevalence would be linked to the arduousness of the work, and to other factors such as eating habits, sedentary lifestyle and psychosocial factors observed among drivers.

The prevalence of diabetes in our study was 4.04%. This result is lower than the prevalence of 7.2% found in the Konsebo study [13] and the prevalence of diabetes according to the 2021 STEPS survey in Burkina Faso, which was 7.6% [18]. This difference is related to the sample size of our study.

The prevalence of total hypercholesterolemia was 35.71%. Our result differs from those of studies conducted by Ilboudo [5] and Konsebo [13], which found 11.3% and 46.84%, respectively. This disparity may be related to the dietary habits observed among the drivers.

The prevalence of sedentary behavior was 55.28%. A similar trend was reported by Hmaiddouch [18], who found a prevalence of 52.1% in his study. A different finding was made by Ilboudo [5] and Diatta [19] in their workplace studies, who found prevalences of 74.7% and 40.2%, respectively.

Sedentary behavior among drivers is linked to the constraints of atypical working hours and the distances covered while driving.

The prevalence of obesity was 9.63%. This prevalence is lower compared to that reported by Ilboudo [5] in his study, which was 15.7%, and 11.3% as the prevalence of obesity in the urban population according to the integrated strategic plan for the fight against non-communicable diseases 2016-2020 of Burkina Faso [17].

This difference in prevalence would be linked to the fact that the majority of drivers in our study population benefit from an annual medical visit, and therefore from dietary advice.

The prevalence of metabolic syndrome was 18.94%. This result corroborates that of Ilboudo [5], who reported 18.3% in the workplace. These prevalence rates are higher than that reported by Hsinet [20], which was 11.7% among professional drivers transporting hazardous materials in Tunisia. These various observations would be related to diet and sedentary lifestyle.

The prevalence of alcoholism in our study was 31.37%. This result is higher than that of Sanogo's study [11], which found a prevalence of 24%. Sanogo's study took place in a country where the most practiced religion prohibits alcohol consumption; alcohol consumption being a taboo subject.

Nowadays, access to alcohol consumption has been facilitated by its availability and packaging. The framework of our study encouraged driver participation, allowing them to speak freely about alcohol consumption.

Alcohol consumption among truck drivers is linked to the arduous nature of the work: stress, isolation, monotony.

The statistical correlation between hypertension and age (OR = 8.62;  $p = 0.01$ ) in our study confirms the trend of increasing prevalence of hypertension with age [21] [22]. Indeed, the incidence of hypertension increases with age due to the increased stiffness of the arteries. A similar finding was made by A.I.N. Arnaud *et al.* [15].

Being over 40 years of age (OR = 0.16;  $p = 0.01$ ) is also a factor that increases the risk of a sedentary lifestyle. This finding corroborates the research results of the French Agency for Food, Environmental and Occupational Health & Safety (ANSES), which demonstrates a positive relationship between the level of sedentary behavior and age [23].

Longevity in a driving position is a factor that increases the risk of tobacco use (OR = 0.22;  $p = 0.04$ ). Tobacco use among truck drivers tends to be high and can increase over time due to work-related stress, fatigue, and long journeys.

### 4.3. Limitations and Constraints

Despite the confidential nature of the survey and the use of a questionnaire based on the WHO STEPS questionnaire, some limitations were observed:

- The dual health and security crisis impacted the transport sector in Burkina Faso, resulting in decreased road traffic and consequently reduced driver participation in medical checkups, which hindered data collection.
- Assessing drivers' eating habits was difficult because meals were mostly consumed outside the home, and quantities were not estimated using conventional units of measurement.
- The prevalence of alcoholic beverage consumption may be underestimated because the topic remains taboo, even though the study was anonymous and confidential.
- The cross-sectional nature of the study does not allow for an in-depth study to establish a causal relationship between cardiovascular risk factors and associated factors.

- A risk map should be developed and compared to the cardiovascular risk levels obtained.

Despite these limitations and constraints, our study makes a significant contribution to the assessment of cardiovascular risk factors among heavy goods vehicle drivers in the city of Ouagadougou.

## 5. Conclusions and Recommendations

This study highlights a high prevalence of cardiovascular risk factors among heavy goods vehicle drivers in the city of Ouagadougou, including hypertension, sedentary lifestyle, and dyslipidemia. Our findings may be underestimated, as few heavy goods vehicle drivers in Ouagadougou undergo annual medical examinations to assess their fitness for driving.

These results demonstrate the importance of strengthening prevention policies in the transport sector through enhanced medical check-ups and raising awareness of cardiovascular risk factors: sedentary lifestyle, high blood pressure, dyslipidemia, diabetes, and other transport-related conditions. Given the importance of this issue, a national epidemiological survey on cardiovascular risk factors among professional drivers should be considered.

## Conflicts of Interest

The authors declare no conflict of interest.

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