Risk Factors for Cardiovascular Disease among Hotel Workers, Bohicon, Benin

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Abstract

Introduction: Non-communicable diseases (NCDs) are on the increase in several sectors of activity. The aim of the study was to determine the frequencies of cardiovascular risk factors (CVRF) and factors associated with hypertension among hotel workers in the city of Bohicon. **Methods:** This was a descriptive and analytical cross-sectional study conducted in the period from December 2018 to January 2019. The variables studied were sociodemographic, occupational, anthropometric and behavioral. Participant recruitment was exhaustive. A standardized questionnaire inspired by the STEPS-WHO questionnaire was used for data collection. After the descriptive analysis, a bivariate analysis was performed using Pearson's Chi-square test or Fisher's test at the 5% threshold. **Results:** A total of 101 workers, 53 (52.47%) of them male, participated in the study. The mean age was 30.60 ± 8.20 years, with extremes of 18 and 55 years. The frequencies of the main risk factors were: 68.32% sitting position > 6 hours/day; 38.61% shift work; 21.78% high psychological demand, 82.18% low decision latitude, 24.75% low social support, 21.78% occupational stress; 7 (6.93%) harmful alcohol consumption; 6.93% tobacco consumption; 48.51% insufficient physical activity; 98.02% insufficient fruit and vegetable consumption; 59.41% overweight; 14.85% HTA. Factors associated with hypertension were: sex, age and marital status. **Conclusion:** Occupational factors need to be taken into account when assessing CVRFs. NCD control programs are needed in all sectors of activity. A larger study is needed in the hotel sector.

Keywords

FDRCV, Occupational Factors, Hypertension, Hotels, Benin

1. Introduction

Non-communicable diseases (NCDs), and in particular cardiovascular disease (CVD), are the world's leading cause of mortality [1]. CVDs are the result of a combination of several risk factors: genetic, biological (hypercholesterolemia, hyperglycemia, obesity, high blood pressure), behavioral (poor diet, lack of physical activity, smoking and harmful use of alcohol) [1]. Several occupational factors are increasingly incriminated in the onset of CVD. These include prolonged sitting at work, occupational stress, shift work, exposure to noise and chemicals [2] [3] [4]. According to the recommendations of the International Labour Organization (ILO), company occupational health departments, where they exist, are responsible for implementing NCD prevention policy in the workplace [5]. In Benin, few data are available on cardiovascular risk factors (CVRFs) of occupational origin, and traditional behavioral risk factors are not always taken into account in company health promotion activities. Hypertension remains the leading CVRF [1]. The prevalence of hypertension in the general population in Benin was 25.2% in 2015 [6]. The prevalence of hypertension varies from one sector of activity to another. In the tertiary sector, the prevalence of hypertension was respectively: 41.9% among employees of the Office de Gestion du Fret Multimodal (Congo Kinshasa); 32.52% among workers of the Ministry of Health (Benin 2012); 25.3% among employees of a bank (Benin 2016) [7] [8] [9]. Hotel workers have easy access to tobacco, alcohol, and are also subject to stress at work due to job insecurity, night work, and also customer demands. Most hotels in Benin do not have an infirmary or an occupational health service to monitor staff. The aim of the present study was to describe CVRF and determine the factors associated with high blood pressure among hotel workers in Bohicon, southern Benin.

2. Materials and Methods

2.1. Type of Study

This was a descriptive and analytical cross-sectional study conducted from December 2018 to January 2019.

2.2. Study Framework

The study took place in hotels in the town of Bohicon in southern Benin. Bohicon is a secondary town in the south of Benin, and is home to several modest hotels. The main activities of these hotels are to provide accommodation and catering for guests.

2.3. Study Population and Sampling

The study population consisted of workers in five hotels. The five hotels were selected using a simple random sample without discounting. The inclusion criteria were: to be an agent with an employment contract with one of the hotels, to have at least 6 months' seniority and not to be part of the administrative man-

agement team. Hotel trainees were not included. All workers meeting the inclusion criteria and present at the time of the survey were recruited.

2.4. Data Collection

Data collection was based on a face-to-face interview. Data were collected using a standardized form based on WHO questionnaires. Information was collected on socio-demographic, professional, behavioral and anthropometric characteristics. The standardized form was integrated into smartphones using the Kobo-Collect application for direct data entry. Physical measurement instruments such as adult mechanical scales (model 761, SECA), graduated mobile scales and graduated flexible metric tapes were used to collect the data required for our study (weight, height, waist circumference). Blood glucose levels were measured using a capillary blood glucose meter. Workers with capillary hyperglycemia underwent venous glycemia. Blood pressure (BP) was measured using a SPENGLER electronic sphygmomanometer fitted with a suitable cuff. BP was measured in the seated position after resting for at least 15 minutes. The measurement was taken on the bare left arm, placed on a table with the palm facing upwards. Three consecutive measurements, 3 minutes apart, were taken. Blood pressure was the mean of the last two measurements.

2.5. Study Variables

1) **Hypertension:** Any subject with a systolic blood pressure (SBP) greater than or equal to 140 mmHg and/or a diastolic blood pressure (DBP) greater than or equal to 90 mmHg, and any subject undergoing antihypertensive treatment according to WHO criteria, was considered hypertensive.

2) **Tobacco consumption:** Any subject who had smoked cigarettes or any other substance in the last 12 months was considered an active smoker.

3) **Alcohol consumption:** Subjects who had consumed alcoholic beverages in the 30 days priorto the survey [STEPS] were considered to be alcohol consumers. Consumption was classified as harmful according to gender. According to the WHO, this is defined as 4 standard glasses per day for women and 6 standard glasses per day for men.

The standard glass is the international unit for measuring alcohol. The net alcohol content of a standard glass is 10 g ethanol. This is equivalent to a standard beer (285 ml), a small glass of liqueur (30 ml), a medium-sized glass of wine (120 ml), or an aperitif (60 ml) [10].

4) **Consumption of fruit and vegetables (FEL):** Information on FEL consumption was obtained from declarations following explanations provided to respondents in relation to self-quantification using FEL portions; a portion corresponds to a mass of 80 g of fruit and/or vegetables [10]. Average daily fruit consumption is calculated as the product of the number of fruit portions consumed per day and the number of days consumed per week, divided by 7; average daily vegetable consumption is calculated as the product of the number of vegetable portions consumed per day and the number of days consumed per

week, divided by 7. Daily FEL consumption is considered sufficient if one of the following 3 conditions is met: average daily fruit consumption ≥ 5 or average daily vegetable consumption ≥ 5 or average daily FEL consumption ≥ 5 per day during the week.

5) Physical activity: A series of questions provided for in the WHO questionnaire. Three different environments are explored: physical activity at work (paid or unpaid; at home or outside); physical activity during leisure or sport; physical activity during travel. Physical activity is considered sufficient if one of the following three conditions is met: a) High-intensity physical activity for 75 minutes or more per week; b) Moderate-intensity physical activity for 150 minutes or more per week; c) An equivalent combination of moderate- and high-intensity physical activity reaching at least 600 MET-minutes per week [11]. Metabolic equivalent (MET) expresses the ratio between metabolic rate during physical activity and metabolic rate at rest. One MET corresponds to the energy expended by a person sitting still, and is equivalent to a consumption of 1 kcal/kg/hour. For the analysis of the questionnaire data, the following principles from the World Physical Activity Questionnaire were applied: it is estimated that the caloric expenditure of a moderately active person is four times higher, and that of a very active person eight times higher, than the caloric expenditure of a person sitting still. To calculate a person's total energy expenditure from questionnaire data, we attribute 4 METs to time spent in moderately intense physical activity and 8 METs to time spent in intense physical activity [11].

6) Overweight: Any worker with a Body Mass Index (BMI) ≥ 25 kg/m^2 was considered overweight (A BMI greater than or equal to 25 kg/m^2 and less than 30 kg/m^2 was considered overweight and any subject with a BMI greater than or equal to 30 kg/m^2 was considered obese).

7) Occupational stress: This was determined using the Karasek questionnaire. This questionnaire is divided into three parts, each of which determines three scores. These parts are: decision latitude (LD), psychological demand (PD) and social support at work (SS).

Responses from "strongly disagree" to "strongly agree" are transformed into values from 1 to 4.

Questions are numbered from K1 to K26. Calculation methods are:

LD = 4 * (K4 + (5 − K6) + K8) + 2 * (K1 + (5 − K2) + K3 + K5 + K7 + K9)

DP = K10 + K11 + K12 + (5 − K13) + K14 + K15 + K16 + K17 + K18

SS = K19 + K20 + K21 + K22 + K23 + K24 + K25 + K26

Decision latitude is low when the score is below 71, psychological demand is high when the score is above 21 and social support is low when the score obtained is below 24 [12]. Work stress has been defined as the combination of low decision latitude and high psychological work demand.

8) Shift work: Refers to any form of work organization in which workers are successively assigned to the same workstations according to a certain rhythm, continuous or discontinuous, requiring them to perform work at different times

over a given period of days or weeks. Shift status is indicated in the job description provided by the employer.

9) Work in a prolonged sitting position: A subject was considered to be in a prolonged sitting position if he or she spent more than 6 hours sitting per day.

2.6. Data Analysis

Data analysis was performed with Epi-info 7.2.6 software, using proportions for qualitative variables and means with standard deviations for quantitative variables. A bivariate analysis was performed to search for associations between hypertension and independent variables. Frequencies were compared using Pearson's chi-square test, Yates corrected chi-square test and Fisher's test, according to the theoretical number of participants. The significance level was set at 5%.

2.7. Ethical Considerations

Permission was obtained from city hotels officials and informed consent was obtained from participants. The data were collected with respect to confidentiality and human rights. Data management and use were done anonymously.

3. Results

3.1. General Features

A total of 101 workers took part in the survey, as shown in the diagram below.

A total of 203 workers on contract with the 5 hotels and not reporting to the management team were identified. Of these, 127 had been with the company for at least 6 months. Of the 127,101 were able to take part in the survey, giving a response rate of 79.52%. The reasons for non-participation were 14 absences from work and 12 refusals to take part in the survey.

The mean age of the workers was 30.60 ± 8.20 years, with extremes of 18 and 55 years. The sex ratio (male/female) was 1.10. Among the workers, 63 (62.38%) were living with a partner, 90 (89.11%) were in school, 68 (67.3%) had a monthly income less than or equal to the guaranteed interprofessional minimum wage (SMIG), which was 45,000 FCFA. At work, 39 (38.61%) were shift workers; 93 (90.08%) had less than 5 years' seniority;

With regard to behavioral characteristics, 7 (6.93%) were smokers; 65 (64.36%) did not engage in any activity; 7 (6.93%) had a harmful alcohol intake, including 5 males; 86 (85.15%) had an inadequate intake of fruit and vegetables (FEL); 19 (18.81%) spent more than 6 hours a day in a seated position.

Anthropometrically, abdominal obesity was observed in 2 (3.73%) of the men and 21 (43.795%) of the women; taking into account the body mass index for all sexes, 33 (32.67%) were overweight, including 10 cases of obesity.

Psychosocially, 22 (21.78%) workers were found to have high psychological demand, 83 (82.18%) low decision latitude, 76 (75.24%) low social support, 22 (21.78%) occupational stress.

3.2. Prevalence of Hypertension

Of the 101 workers included, 15 had hypertension, for a prevalence of 14.85%; $CI_{95\%}$: [7.23 - 20.16].

3.3. Factors Associated with Hypertension

3.3.1. Socio-Demographic, Professional and Psychological Characteristics

Among the socio-demographic and occupational factors studied, those associated with hypertension were: gender (p = 0.028), age (p = 0.003) and marital status (p = 0.001).

The frequency of hypertension was 22.92% in women versus 7.55% in men. With regard to age, there was an increase in frequency with age, ranging from an absence of hypertensives among the youngest workers (18 to 24 years), to 12.50% between 25 and 34 years, then to 32% over 25 years.

Marital status was associated with hypertension, with an increasing frequency among the never married (3.13%), married (15.9%) and separated (66.7%). Table 1 summarizes the distribution of workers according to hypertension and socio-demographic characteristics.

Expected occupational factors were not associated. However, the prevalence of hypertension was 16.2% in workers with salary ≤ SMIG vs. 12.3% in those with income > SMIG; 12.8% in shift workers vs. 16.1% in non-shift workers; 16.5% in non-stressed workers vs. 9.09% in stressed workers; 15.66% in those with low decision latitude vs. 11.11% in those with high decision latitude. Table 2 summarizes the distribution of workers according to hypertension and occupational characteristics.

3.3.2. Behavioral Characteristics

None of the behavioral characteristics studied was associated with hypertension. The prevalence of hypertension was 7.84% in male non-alcoholics versus 0.0% in alcoholics; 20.93% in female non-alcoholics versus 40% in alcoholics; 14.29% in smokers versus 14.89% in non-smokers; 15.38% in those who engage in physical activity versus 14.29% among those who don't; 10.14% among those who sit for long periods at work versus 25% among those who don't; 50% among those who take at least 5 FELs a day versus 14.14% among those who take more than 5 FELs a day.

Table 3 shows the distribution of hypertension among workers according to behavioral characteristics.

3.3.3. Anthropometric Characteristics

Among the anthropometric characteristics studied, no factor was associated with hypertension. With regard to abdominal obesity, all cases of hypertension were observed in men without abdominal obesity, whereas in women, the prevalence of hypertension was 33.33% in women with abdominal obesity versus 14.81% in women without abdominal obesity. Taking BMI into account, the prevalence of

Table 1. Socio-demographic factors and hypertension in hotel workers, Bohicon 2019; (n = 101).

	Total	Hypertension				p-value
		Yes		No		
		n	%	n	%	
Gender						0.028*
Male	53	4	7.55	49	92.45	
Female	48	11	22.92	37	77.08	
Age (years)						0.003*
18 - 24	20	0	0.00	20	100.00	
25 - 34	56	7	12.50	49	87.50	
≥35	25	8	32.00	17	68.00	
Education level						0.084
No official instructions	16	5	31.25	11	68.75	
Primary	19	4	21.05	15	78.95	
Secondary	59	6	10.17	53	89.83	
Superior	7	0	0.00	7	100.00	
Marital status						0.001*
Never married	32	1	3.13	31	96.88	
Married	63	10	15.9	53	84.13	
Separate	6	4	66.7	2	33.33	
Socioeconomic level						0.585
≤SMIG	68	11	16.2	57	83.82	
>SMIG	33	4	12.1	29	87.88	

*Statistically significant association.

Table 2. Occupational factors and hypertension in hotel workers, Bohicon 2019; (n = 101).

	Total	Hypertension				p-value
		Yes		No		
		n	%	n	%	
Shift work						0.646
Yes	39	5	12.8	34	87.18	
No	62	10	16.1	52	83.87	
Occupational stress						0.368
Yes	22	2	9.09	20	90.91	
No	79	13	16.5	66	83.54	

Continued

Decision-making latitude						0.612
High	18	2	11.11	16	88.89	
Low	83	13	15.66	70	84.34	
Psychological demand						0.368
High	22	2	9.09	20	90.91	
Low	79	13	16.46	66	83.54	
Social support						0.240
Yes	25	2	8.00	23	92.00	
No	76	13	17.11	63	82.89	

Table 3. Behavioral factors and hypertension among hotel workers, Bohicon 2019; (n = 101).

	Total	Hypertension				p-value
		Yes		**No**		
		n	%	n	%	
Harmful alcohol consumption (Men)						0.571
Yes	2	0	0.00	2	100.00	
No	51	4	7.84	47	92.16	
Harmful alcohol consumption (Female)						0.364
Yes	5	2	40.00	3	60.00	
No	43	9	20.93	34	79.07	
Current smoker						0.965
Yes	7	1	14.29	6	85.71	
No	94	14	14.89	80	85.11	
Physical activity						0.877
Yes	52	8	15.38	44	84.62	
No	49	7	14.29	42	85.71	
Number of hours in seated position						0.059
≤5 hours	32	8	25.00	24	75.00	
>5 hours	69	7	10.14	62	89.86	
Fruit and vegetable consumption						0.236
<5 servings	99	14	14.14	85	85.86	
≥5 servings	2	1	50.00	1	50.00	

hypertension was 11.67% in workers with a normal BMI, 17.39% in overweight workers and 40% in obese workers. Table 4 shows the distribution of hypertension among workers according to anthropometric characteristics.

4. Discussion

The aim of this study was to describe CVRF and to determine the prevalence and factors associated with hypertension in workers at five hotels in the town of Bohicon. The results obtained for the main risk factors were: 18.81% sitting position > 6 hours/day; 38.61% shift work; 6.93% harmful alcohol consumption; 6.93% smoking; 64.36% lack of physical activity; 85.15% insufficient consumption of FEL; 32.67% overweight; 21.78% occupational stress; 14.85% HTA. Factors associated with hypertension were gender, age and marital status.

Behavioral risk factors are modifiable factors that can be corrected at the worker's discretion. The frequency of alcohol consumption is lower than the national result which is 26.5% according to the STEPS survey [6]. On the other hand, the frequency of exposure to smoked tobacco is higher than the national survey figure of 5% [6]. This difference could be linked to workers' easy access to these products, sold at hotel reception desks.

The insufficiency of FEL consumption, although high in the present study, is nevertheless lower than the national results [6], which is not the case for the practice of physical activities. In fact, the prevalence of insufficient physical activity is higher than at national level.

The definite advantage of physical activity and sufficient consumption of FEL in the reduction of biological CVRF is well known [13] [14].

Table 4. Anthropometric factors and hypertension in hotel workers, Bohicon 2019; (n = 101).

	Total	Hypertension				p-value
		Yes		No		
		n	%	n	%	
Waist circumference (men)						0.571
≤102 cm	51	4	7.84	47	92.16	
>102 cm	2	0	0.00	2	100.00	
Waist circumference (women)						0.130
≤88 cm	27	4	14.81	23	85.19	
>88 cm	21	7	33.33	14	66.67	
BMI						0.074
Lean	8	0	0.00	8	100.00	
Normal	60	7	11.67	53	88.33	
Overweight	23	4	17.39	19	82.61	
Obesity	10	4	40.00	6	60.00	

Obesity is a major risk factor for metabolic disorders re-exposing people to CVD. The prevalence of obesity obtained in the present study seems very high compared with the national statistics result (25%) [6], but similar to the 44% result obtained by Hinson *et al.* in the commercial company [15]. This may also be linked to occupational factors, in particular prolonged sitting.

Indeed, in terms of occupational risk factors, a sedentary lifestyle at work and shift work (particularly at night) are generally associated with the onset of several chronic diseases [4] [16] [17]. The significant proportion of workers exposed to these risk factors in these hotels deserves to be taken into account during NCD awareness and education sessions. Stress at work is also mentioned as a risk factor for CVD. The prevalence of occupational stress in the present study appears to be low in comparison with an earlier study [18] conducted in Benin, but in the industrial sector.

The prevalence of hypertension was lower than the national average of 25.2% [6] and also lower than those of 41.90% and 54.1% respectively obtained by Kusuayi *et al.* and Mbaye *et al.* [8] [19] in the tertiary sector in countries of the sub-Saharan region. On the other hand, this result was similar to that obtained in a marie in the town of Bohicon, the same town as that of the present study, which was 18.6% [20]. Two associated factors known from the literature were found: age and gender.

The association between age and hypertension has also been observed by several authors in occupational settings, in Congo, Bénin and Senegal [8] [9] [19]. A significant association between gender and hypertension was observed among workers, with a tendency for women to be more affected than men. This result is unusual. The workers in the present study were aged between 18 and 55. Normally, for this age group, women are not yet menopausal and benefit from the protective effect of oestroprogestogenic hormones. However, after the age of 50, the risk of hypertension is similar in men and women [21].

Some factors expected to be associated with hypertension were not found in the present study. These include obesity and work-related stress. Obesity has not been associated with hypertension. Several authors, such as Kusuayi *et al.* [8] found that obese workers were 5 times more likely to be hypertensive (p = 0.020). Hinson *et al.* (p = 0.010) and Mbaye *et al.* (p < 0.001) also made the same observation [9] [19].

Some occupational factors were expected but were not found to be associated with hypertension in the present study. These included occupational stress, shift work [22] which were found to be associated factors in a similar study in an industrial setting in the same country. This difference may be related to the sample size.

At the end of this study, a program of awareness-raising and regular screening for FDRCV was proposed to the various hotel departments.

This study provides information on CVRFs in a group of workers. The strong point was the possibility of setting up an awareness and screening program

within the hotels. The main limitation of the study is that it only took into account a single CVRFs screening event.

5. Conclusion

Occupational factors need to be taken into account when assessing CVRFs. NCD control programs are needed in all sectors of activity. A larger study is needed in the hotel sector.

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Conflicts of Interest

The authors declare that there are no conflicts of interest related to this study.

References

[1] WHO (2017) Cardiovascular Diseases.
https://www.who.int/fr/news-room/factsheets/detail/cardiovascular-diseases-(cvds)

[2] Lawrence, E.C. (2021) Occupational Health Risks of Practicing Medicine. *Mayo Clinic Proceedings*, **96**, 2025-2027. https://doi.org/10.1016/j.mayocp.2021.06.014

[3] Price, A.E. (2004) Heart Disease and Work. *Heart*, **90**, 1077-1084.
https://doi.org/10.1136/hrt.2003.029298

[4] de Gaudemaris, R., Lang, T., Hamici, L., Dienne, E. and Chatellier, G. (2002) Socio-Professional Factors, Constraints of the Occupational Environment and Cardiovascular Disease. *Annales de Cardiologie et d'Angéiologie*, **51**, 367-372.
https://doi.org/10.1016/S0003-3928(02)00149-X

[5] WHO (2007) Global Plan of Action for Workers' Health.

[6] Ministère de la Santé (MS), Direction Nationale de la Protection Sanitaire (DNPS) and Programme National de Lutte contre les Maladies non Transmissibles (PNLMNT) (2016) Rapport final de L'enquête pour la surveillance des facteurs de risque des maladies non transmissibles par l'approche STEPS wise de l'OMS Enquête STEPS 2015.
https://cdn.who.int/media/docs/default-source/ncds/ncd-surveillance/data-reporting/benin/steps/2015-steps-benin-factsheet-fr.pdf

[7] Beaney, T., Schutte, A.E., Tomaszewski, M., Ariti, C., Burrell, L.M., Castillo, R.R., *et al.* (2018) May Measurement Month 2017: An Analysis of Blood Pressure Screening Results Worldwide. *The Lancet Global Health*, **6**, e736-e743

[8] Kusuayi, M.G., Nkiama, K.C., Delecluse, C. and Lepri, F.B. (2018) Evaluation of the Prevalence of Adult Hypertension in the Workplace in Kinshasa, Democratic Republic of Congo. *Science & Sports*, **33**, 213-220.
https://doi.org/10.1016/j.scispo.2018.04.002

[9] Hinson, A.V., Affo, Y., Mikponhoue, R., Adjobime, M. and Fayomi, B. (2019) Epidemiological Aspects of the High Blood Pressure in Occupational Environment-Case of a Bank in Cotonou (Benin). *Journal of Environmental Science and Public Health*, **3**, 435-449.

[10] World Health Organization (2005) The WHO STEPwisede Approach to Chronic Disease Risk Factor Surveillance. https://bookorders@who.int

[11] World Health Organization (2021) Global Physical Activity Questionnaire. https://www.who.int/publications/m/item/global-physical-activity-questionnaire

[12] Niedhammer, I., Ganem, V., Gendrey, L. and David, S.D.S. (2006) Psychometric Properties of the French Version of Karasek's Job Content Questionnaire Scales of Psychological Demand, Decision Latitude and Social Support. *Sante Publique*, **8**, 413-427.

[13] Gojanovic, B. (2015) Physical Activity, Sport and Hypertension. *Revue Médicale Suisse*, **11**, 1426-1433. https://doi.org/10.53738/REVMED.2015.11.481.1426

[14] Ravera, A., Carubelli, V., Sciatti, E., Bonadei, I., Gorga, E., Cani, D., *et al.* (2016) Nutrition and Cardiovascular Disease: Finding the Perfect Recipe for Cardiovascular Health. *Nutrients*, **8**, Article 363. https://doi.org/10.3390/nu8060363

[15] Hinson, A.V., Kpata, S., Wognin, B.S., Mikponhoue, R., Adjobimey, M., Ayelo, P., *et al.* (2017) Prevalence of Metabolic Syndrome and its Associated Factors among the Employees of a Commercial Company in Togo. *Scientific Federation Journal of Public Health*, **1**, 1-11.

[16] Vetter, C., Devore, E.E., Wegrzyn, L.R., Massa, J., Speizer, F.E., Kawachi, I., *et al.* (2016) Association between Rotating Night Shift Work and Risk of Coronary Heart Disease among Women. *JAMA: Journal of the American Medical Association*, **315**, 1726-1734. https://doi.org/10.1001/jama.2016.4454

[17] Li, W., Yu, K., Jia, N., Xu, X., Yuan, Y., Peng, R., *et al.* (2021) Past Shift Work and Incident Coronary Heart Disease in Retired Workers: A Prospective Cohort Study. *American Journal of Epidemiology*, **190**, 1821-1829. https://doi.org/10.1093/aje/kwab074

[18] Adjobimey, M., Hinson, V., Mikponhoué, R., Hountohotegbe, E., Klikpo, E., Cissé, I.M., *et al.* (2022) Occupational Stress in Industry Setting in Benin 2019: A Cross-Sectional Study. *PLOS ONE*, **17**, e0269498. https://doi.org/10.1371/journal.pone.0269498

[19] Adjobimey, M., Mikponhoué, R., Frimège, D.F., Cissé, I.M., Tchibozo, C., Hountohotegbe, E., *et al.* (2022) Hypertension and Work Stress among City Hall Workers, Bohicon, Benin. *Occupational Diseases and Environmental Medicine*, **10**, 102-115. https://doi.org/10.4236/odem.2022.102009

[20] Mbaye, A., Ndiaye, M.B., Kane, A.D., Ndoume, F., Diop, S., Yaméogo, N.V., *et al.* (2011) Occupational Medicine Worldwide. Screening for Cardiovascular Risk Factors in Workers of a Private Telecommunications Company in Senegal. *Archives des Maladies Professionnelles et de l'Environnement*, **72**, 96-99. https://doi.org/10.1016/j.admp.2010.10.001

[21] Blacher, J., Kretz, S., Sorbets, E., Lelong, H., Vallee, A., Lopez-Sublet, M., *et al.* (2019) Epidemiology of Hypertension: Differences between Women and Men. *La Presse Médicale*, **48**, 1240-1243. https://doi.org/10.1016/j.lpm.2019.04.010

[22] Adjobimey, M., Houehanou, C.Y., Cisse, I.M., Mikponhoue, R., Hountohotegbe, E., Tchibozo, C., *et al.* (2024) Work Environment and Hypertension in Industrial Settings in Benin in 2019: A Cross-Sectional Study. *BMJ Open*, **14**, e078433.