Hypertension and its determinant factors in a Brazilian male working population

Hypertension in male workers

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Abstract
Among men, hypertension stands out as a specific public health problem, as this population has lower rates of treatment, knowledge, and disease control, and less adherence to medication. It was used baseline data from a longitudinal study, conducted with a sample of 1,024 male workers aged 18 years or older from a municipality in Northeast Brazil. Hypertension was defined as systolic blood pressure $\geq 140$ mmHg and/or diastolic blood pressure $\geq 90$ mmHg, and/or prior diagnosis of hypertension and/or use of antihypertensive drugs. Population attributable fractions (PAFs) were calculated for the associated lifestyle factors. The prevalence of hypertension in this population was of 28.6% (95% CI: 25.9-31.5); the distal factors were age, skin color/ethnicity, and household income; intermediate factors: alcohol abuse, tobacco consumption, perception of high salt intake, and physical inactivity; and the proximal factor body mass index were positively associated with hypertension in male workers. Higher PAFs were observed among workers with tobacco and alcohol abuse, perceived high salt intake, physically inactive, and overweight and obese. Is necessary to take specific actions geared to orientation, prevention, and health promotion in workplaces to reduce complications from hypertension and improve lifestyle among this male population.

Introduction
Hypertension is one of the significant risk factors for cardiovascular diseases (CVD) and affects one billion people worldwide, with a high impact on loss of work productivity and household income\(^1\). In all countries, men have a higher prevalence of hypertension when compared to women\(^2\). In Brazil, this scenario may still be underestimated since 4.3 million Brazilian adults have never assessed their blood pressure (BP), especially men\(^3\).

Among men, hypertension stands out as a specific public health problem, as this population has lower rates of treatment, knowledge, and disease control, and less adherence to medication\(^4\). Such behavior may be related to the fact that they only pursue medical care when symptoms and possible disease complications are set.

Individuals’ health condition is affected by the environment in which they are inserted, their social relationships, and their socioeconomic and cultural conditions. The work environment can be a risk
factor for worker’s health\textsuperscript{5}, predisposing to the emergence of chronic diseases. Hypertension has been prominent in both male and workers’ population and both combined; this group’s lifestyle is characterized by inappropriate habits and behavior, such as tobacco consumption, alcohol intake, unbalanced diet, and sedentary routines at both home and work\textsuperscript{6-8}. The life context of this group should be considered in the implementation of health actions by government agencies and workplace managers\textsuperscript{9}.

Hypertension control has been associated with a lower level of stroke, myocardial infarction, and heart failure. Data from a cohort study involving male workers revealed that almost half had hypertension, and only 65% had their blood pressure levels controlled\textsuperscript{10}. They list male concerns, which were focused on family support more than health care and less demand for health services. This contributes to late diagnosis of diseases that could be controlled or treated, leading to complications that are often irreversible\textsuperscript{11}.

In 2013, the WHO established a global set of targets for relative hypertension prevalence reduction of 25\% by 2020\textsuperscript{12}. The achievement of these goals requires lifestyle interventions in order to eliminate or reduce modifiable risk factors, as well as to promote health situation screening and search to prevent, detect, and treat hypertensive patients\textsuperscript{9}.

This work aims to identify the prevalence of hypertension and investigate the associated factors in Brazilian male workers.

Methods
This is a cross-sectional study that utilized data from the longitudinal project HealthRise Vitória da Conquista. Vitória da Conquista is the third largest city in Bahia State, Northeast Brazil\textsuperscript{13}. The research was carried out with a population of workers attended at the Industry Social Service unit. The data are from the baseline conducted between August 2017 and July 2018.

All employees aged 18 years or older, residing in the city, who used to attend the unit for routine or periodic appointments with the occupational physician and who were not in a situation of dismissal were considered for the sample calculation, totaling 2,014 workers. A confidence level of 95\%, a
prevalence of 50% (due to several outcomes measured in the main project), and an error margin of 2% were applied. The final sample was 1,218 workers considering 10% of losses. Respondents totaled 1,275 workers, of which 1,024 were male, and that was the study population.

Data Collection

Individual interviews were conducted by adequately trained interviewers using tablets enabled with the KoboToolbox software (https://www.kobotoolbox.org/). The interview instrument used was a semi-structured form based on the questionnaire from the National Health Survey\textsuperscript{14}, International Physical Activity Questionnaire (IPAQ)\textsuperscript{15} in its short version, and the EUROHIS quality of life scale\textsuperscript{16}. Three blood pressure assessments (with a one-minute interval each) were performed using the internationally validated Omron digital sphygmomanometer HEM-7113\textsuperscript{17}. The measurements were carried out after the interviews to ensure that individuals were at rest, sitting with their legs uncrossed, their feet resting on the floor, their backs reclining on the chair and relaxed, their left arm resting on the table at the level of the heart. It was assured that they did not have a full bladder, had not exercised for at least 60 minutes, had not consumed alcohol, coffee, or food, and had not smoked in the last 30 minutes. The final value of blood pressure was obtained through the last two measurements\textsuperscript{18}.

The weight was verified through a digital portable electronic scale of the brand SECA 813. Height was measured with the portable stadiometer NutriVida, consisting of an extensor with a numerical scale and base to support the feet. Waist circumference was gauged with a measuring tape, considering the midpoint between the lower edge of the last rib and the upper border of the iliac crest.

Variables

The dependent variable in this study was hypertension, classifying as hypertensive all those with a previous medical diagnosis of hypertension and/or, systolic blood pressure values $\geq 140$ mmHg and/or diastolic blood pressure $\geq 90$ mmHg and/or used antihypertensives\textsuperscript{18}.

The independent variables were structured in the following blocks: sociodemographic, lifestyle, and anthropometric indices.
Sociodemographic variables included age (18–29 years, 30–39 years, 40 years and over), skin color/ethnicity (white, black, yellow, brown, and indigenous), marital status (single, married or living with a partner, divorced/widow), household income (less than 2 minimum wages, from 2 wages to less than 3 minimum wages, or 3 wages and over), and years of schooling (0–8 years, 9–11 years, 12 years and over).

Work shifts were divided into day/night and day only. The position held was classified according to the Brazilian Classification of Occupations (CBO)\textsuperscript{19}, and divided into manual laborer (industrial, civil construction, general services and diverse manual services workers) and non-manual laborer (administrative, health, and education workers)\textsuperscript{20}.

Lifestyle classified alcohol abuse those men who reported ingesting five or more doses of alcoholic beverage in a single occasion in the last 30 days\textsuperscript{21}. Positively classified tobacco users were those who reported smoking during the study period\textsuperscript{22}.

Regarding dietary habits, weekly intake of fruits, salads and raw vegetables, in which each variable was categorized as appropriate if they consumed these foods five days per week or greater, and inappropriate if consumption was less than five days per week\textsuperscript{23}. The intake of ultra-processed foods was rated as positive for those who reported replacing meals with these foods in at least one day of the week\textsuperscript{23}. Perception of salt consumption was established with the following question: “Considering freshly prepared food and processed foods, do you think your salt intake is”, reclassified as “low/very low; appropriate; high/very high”\textsuperscript{24}.

Physical activity (PA) was evaluated by the short version of IPAQ\textsuperscript{15}, and was measured by multiplying the weekly frequency (days) by the mean duration (minutes) of the moderate and vigorous PA practice. The time spent on vigorous activities was multiplied by two. Only activities performed for at least 10 continuous minutes were validated. Those who practiced less than 150 minutes of PA per week were considered as inactive\textsuperscript{25,26}.

Quality of life was assessed by EUROHIS\textsuperscript{16}. The scale consists of eight items covering general health,
interpersonal, financial, and household relationships. Quality of life is calculated by adding the eight items, in which higher scores indicate a better quality of life\textsuperscript{16}.

The Body Mass Index of the participants was described\textsuperscript{27} as follows: \textless18.5 Kg/m\textsuperscript{2} “lean or low weight”; 18.5–24.9 Kg/m\textsuperscript{2} “regular”; 25–29.9 Kg/m\textsuperscript{2} “Overweight”; and BMI > 30kg/m\textsuperscript{2} “Obesity”. Waist circumference was categorized as adequate (<94cm), increased (≥ 94cm), and greatly increased (≥ 102cm)\textsuperscript{28}.

Statistical analysis

The prevalence of hypertension among male workers was measured, with confidence interval of 95%. The verification of factors associated with hypertension was performed with bivariate and multivariate analyses, with estimated prevalence ratios and calculation of the respective p-value and confidence interval through Poisson regression with robust variance.

Concerning the selection variables for modeling, those with a statistical significance of up to 20% (p <0.20) were used in the univariate analysis. The hierarchical input of variables in blocks was performed in the following order: sociodemographic variables, lifestyle, and anthropometric indices. A statistically significant association was considered when p-value ≤ 0.05, after adjusting for the factors of the same block and of the hierarchically upper blocks. The Akaike criterion (AIC) was applied to compare models.

The population attributable fraction (PAF) was calculated for some modifiable associated factors. It estimates the disease proportion or health-related event that would be prevented in the population if the risk factor were eliminated. The formula adopted for the calculation of PAF was as follows: \textit{PAF} = \frac{\text{Pe} (\text{RP} - 1)}{1 + \text{Pe} (\text{RP} - 1)}, where Pe is the proportion of population exposure, RP is the disease prevalence in the exposed individuals / disease prevalence among those not exposed\textsuperscript{29}. The Stata program (version 14) was used in data analysis.

This research was approved by the Research Ethics Committee of the Multidisciplinary Health Institute of the Federal University of Bahia (CAEE 62259116.0.0000.5556) and the participants who agreed to participate gave their informed consent in writing.
Results
Among the 1,024 participants, 28.6% (95% CI: 25.9–31.5) were classified as hypertensive.

The population profile revealed a more significant proportion of males aged 30–39 years (40.3%), who self-declared brown (54.7%), married (65.1%), with a household income lower than 2 minimum wages (36.7%), nine to eleven schooling years (52.9%), were manual (62.0%) and day-shift workers (79.2%). Regarding lifestyle, 32.1% of the men were alcohol abusers and 10.1% consumed tobacco. Most of them had an inappropriate intake of fruits, salads, and raw vegetables. About 40% of the respondents used to replace the significant meals with ultra-processed foods, and most considered their salt intake as appropriate (65.2%). More than half was classified as physically active. Regarding nutritional status, more than 40% were overweight or obese (Table 1).

In the univariate analysis (Table 2), a higher prevalence of hypertension was observed among men aged 40 years and over, married or living with a partner, who consumed tobacco, reported high salt intake, were classified as physically inactive, and were overweight.

The mean quality of life perception of hypertensive patients was lower (30.9; SD: ± 3.50) than for non-hypertensive patients (31.2; SD: ± 3.51), but not in a statistically significant way (P-value = 0.14).

The hierarchical multivariate analysis (Table 3) evidenced an association between age of 40 years and over, black self-declared skin color, and income greater than or equal to three minimum wages with a higher prevalence of hypertension. Regarding lifestyle variables (model 2), alcohol abuse, tobacco consumption, perceived high salt intake, and being physically inactive were positively associated with hypertension. In model 3, it was observed that overweight and obese men had a higher prevalence of hypertension.

The PAFs (Table 4) were calculated for lifestyle and health variables through the adjusted prevalence ratios obtained in the multivariate analysis, which remained associated in the final model. Higher PAFs were observed among individuals with tobacco use, alcohol use, perceived high salt intake, who were physically inactive, overweight and obese.

Discussion
This research carried out with a population of Brazilian male workers revealed a high prevalence of hypertension. Sociodemographic, lifestyle, and anthropometric variables were associated with hypertension in this population. Age equal or higher than 40 years, black skin color, household income of three minimum wages or more, alcohol intake, tobacco consumption, perception of high salt intake, physical inactivity, and being overweight or obese were associated with a higher prevalence of hypertension.

High hypertension rates in men have also been noticed in national and international works. Africa recorded a prevalence of hypertension of 36.5%\textsuperscript{30}, and India, 46.1%\textsuperscript{31}. In Brazil, the prevalence of hypertension in men was 33%, 30.6% in Bahia, and 29.5% in Northeast region\textsuperscript{9}. Concerning the specific population of male workers, a 42% incidence of hypertension in industrial workers in Spain\textsuperscript{10} was found in longitudinal studies, and 20.6% in workers in a car factory in Japan\textsuperscript{32}. In Brazil, in a cross-sectional study involving public sector workers (n = 350), 37.8% had hypertension\textsuperscript{33}.

In this work, the highest age category showed a higher prevalence of hypertension. The association between age and hypertension is already consolidated in literature\textsuperscript{3,9,11,32,33} and is explained by the physiological changes inherent to the aging process and associations with other comorbidities. Older people more often pursue health services, are more assisted, and much interested in identifying diseases that can be asymptomatic\textsuperscript{34}. This study population consisted of adults (up to 59 years); thus, a possible manifestation of work-related adverse effects on the health condition is observed, such as the emergence of chronic diseases at earlier ages among them. Work organization-related aspects are potentially stressful and may be associated with a higher occurrence of hypertension\textsuperscript{32,35}.

Regarding skin color/ethnicity variable, it was noticed that those who self-declared black showed a positive association with hypertension. Morbidity and mortality due to hypertension are more significant among black people\textsuperscript{34,36,37}. Brazilian morbidity and mortality rates are strongly affected by social inequalities, causing an unequal distribution of chronic noncommunicable diseases, such as hypertension\textsuperscript{4,9}. The Northeast region is historically identified as having a large contingent of black
and brown people and lower income, health, and education conditions, with several vulnerable population groups\textsuperscript{9,36}. The context in which the population groups are inserted may be more related to hypertension than genetic differences observed between skin colors\textsuperscript{37,38}. Reducing social inequalities can increase hypertension prevention and control in Brazil, especially in the regions most affected by uneven income distributions.

In this research, the category of higher household income was positively associated with hypertension. It is known that economic status is associated with other aspects such as educational level. Also, hypertensive individuals with higher income also had higher schooling (data not shown). Education promotes access to information and demands for health services\textsuperscript{34}, and may increase opportunities for chronic diseases diagnosis.

Some lifestyle-related variables have been related to hypertension. Individuals who reported alcohol abuse had a higher prevalence of hypertension. Alcohol consumption increases blood pressure\textsuperscript{20–22}. Among workers, this habit can be motivated by job insecurity, professional restrictions, job dissatisfaction, and stress\textsuperscript{6}. This behavior may imply specific work-related injuries, and be a risk factor for health problems, such as an increased frequency of illnesses or functional limitations, besides being related to violent events\textsuperscript{20}.

There was also a higher prevalence of hypertension among men with tobacco use. Studies indicate that the prevalence of smoking is higher among men when compared to women. The most vulnerable to smoking workers are those exposed to more significant stress in workplace\textsuperscript{39}, and this behavior is often motivated by the need for relaxation\textsuperscript{6}. The intake of psychoactive substances may lead to an increased absenteeism rates due to the higher possibility of disease\textsuperscript{40}. Tobacco is associated with hypertension and its complications, such as coronary artery disease and stroke\textsuperscript{33}. Reinforcing campaigns to stop this habit in the workplace can promote discontinuation of the practice and improve the workers’ lifestyle.

Regarding the dietary profile, the variable that assessed the perception of salt intake was associated
with the final model. Participants who declared to consume a high level of salt had a higher prevalence of hypertension. Higher sodium intake among male workers has already been shown in literature\(^7\). It is known that salt restriction has a favorable influence on BP control, and is a powerful tool in the prevention and control of hypertension.

High salt intake may be related to the profile of foods consumed by the study sample. Most of the sodium comes from processed foods and meals made outside the home, due to an intense routine, typical of this population. Unhealthy eating habits may favor the emergence of comorbidities, increase absenteeism rates, and consequently, decrease time in productive activities\(^7,24,40\). Due to this scenario, more considerable attention should be given to the common spaces in which workers have their meals and strategies regarding the provided food and the promotion of activities that sensitize workers about healthy eating should be adopted.

Again regarding lifestyle factors, hypertension was more prevalent among those classified as physically inactive. It is known that physical activity can contribute to the absence or reduced levels of hypertension\(^41\); however, there is low adherence to this practice among hypertensive individuals, especially workers, due to the extended work hours and physical fatigue\(^42\). There is a tendency to reduce energy expenditure at work and increase physical inactivity. Promoting interventions that encourage the reduction of sedentary lifestyle at the workplace will contribute to the promotion of health care for workers.

The workers who were classified as overweight or obese had a higher prevalence of hypertension. Increased body weight may be considered a risk factor for the development of hypertension, contributing in up to 30% of the cases\(^27\). Unhealthy lifestyles and intense work hours negatively affect workers’ health, resulting in increased body weight and consequent onset of chronic diseases\(^7,8,32\).

Considering the calculation of the PAFs, it is observed that if the exposures were modified, in other words, if the number of individuals with abusive alcohol and tobacco consumption and salt intake were reduced, the prevalence of the disease would be lowered by 20%. Reducing physical inactivity and overweight would curb the disease prevalence by 39.5%. Lifestyle changes are the most effective
method to reduce blood pressure, contribute to its control and decrease its complications. Calculating PAF provides essential information on the impact of modifiable behaviors on health, and public health intervention and prevention programs should focus on these aspects in order to curb disease complications.

The study has some limitations. The cross-sectional design prevents the establishment of cause and effect relationships. Comparability with other works was also hampered by the paucity of studies involving the male worker population. Also, the analyses were based on two PA measures collected at the same time. It is known that the clinical diagnosis recommends at least two collections at different times; however, data are cross-sectional from a baseline performed as a screening for hypertension.

The male working population of this study is vulnerable to modifiable risk factors. Encouraging the planning, execution, and assistance of health promotion programs in the workplace can contribute to the prevention of future complications, comorbidities and reduction of economic impacts on the health sector due to the disease.

This work is highly relevant as it evaluates hypertension in a specific population; therefore, it requires differentiated attention. Few studies address workers’ health issues, specifically men, as a population group with time constraints, reduced availability for participation in researches, and little interest in prioritizing their health.

Declarations

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INTEREST CONFLICTS

The authors declare that they have no conflicts of interest.

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Tables
Table 1: Characteristics of the male working population of a municipality in the northeast of Brazil, 2017-2018.
| Variables                                      | *n  | %    |
|-----------------------------------------------|-----|------|
| **Sociodemographic**                          |     |      |
| Age (years)                                   |     |      |
| 18-29                                         | 329 | 32.1 |
| 30-39                                         | 413 | 40.3 |
| ≥ 40                                          | 282 | 27.5 |
| Race                                          |     |      |
| White                                         | 197 | 19.4 |
| Black                                         | 217 | 21.4 |
| Yellow                                        | 28  | 2.8  |
| Brown                                         | 555 | 54.7 |
| Indigenous                                    | 17  | 1.7  |
| Marital Status                                |     |      |
| Single                                        | 291 | 28.4 |
| Married or with a partner                     | 667 | 65.1 |
| Separated/Widowed                             | 66  | 6.5  |
| Family income                                 |     |      |
| < 2 wages                                     | 367 | 36.7 |
| 2 wages to < 3 wages                          | 280 | 28.0 |
| ≥ 3 wages                                     | 352 | 35.2 |
| Years of study                                |     |      |
| 0-8                                           | 287 | 28.1 |
| 9-11                                          | 541 | 52.9 |
| ≥ 12                                          | 194 | 19.0 |
| Work shift                                    |     |      |
| Daytime / Nocturnal                           | 210 | 20.8 |
| Daytime                                       | 799 | 79.2 |
| Work positions                                |     |      |
| Non-manual                                    | 389 | 38.0 |
| Manual                                        | 635 | 62.0 |
| **Lifestyle**                                 |     |      |
| Alcohol abuse                                 |     |      |
| No                                            | 693 | 67.9 |
| Yes                                           | 328 | 32.1 |
| Smoking                                       |     |      |
| No                                            | 920 | 89.9 |
| Yes                                           | 103 | 10.1 |
| Fruit consumption                             |     |      |
| Inadequate                                    | 678 | 66.6 |
| Adequate                                      | 340 | 33.4 |
| Consumption of salad and raw vegetables       |     |      |
| Inadequate                                    | 589 | 57.6 |
| Adequate                                      | 434 | 42.4 |
| Ultra-processed food consumption              |     |      |
| No                                            | 620 | 60.6 |
| Yes                                           | 403 | 39.4 |
| Perception of salt consumption                |     |      |
| Low / Very low                                | 186 | 18.2 |
| Adequate                                      | 668 | 65.2 |
| High / very high                              | 170 | 16.6 |
| Physical activity practice                    |     |      |
| Active                                        | 646 | 63.2 |
| Inactive                                      | 375 | 36.7 |

*nn*: absolute number (may vary in relation to losses and non-responders); **CI 95%**: 95%
Continuation table 1: Characteristics of the male working population of a municipality in the northeast of Brazil, 2017-2018.

| Variables                        | *n  | %   |
|----------------------------------|-----|-----|
| Health/disease                   |     |     |
| Body Mass Index                  |     |     |
| Underweight /Normal weight       | 523 | 51.1|
| Overweight                       | 365 | 35.7|
| Obese                            | 135 | 13.2|
| Waist circumference              |     |     |
| Adequate                         | 744 | 72.7|
| Increased/greatly increased      | 280 | 27.3|

*n : absolute number (may vary in relation to losses and non-responders); **CI 95%: 95% confidence interval.

Table 2: Bivariate analysis of hypertension in the male working population of a municipality in northeastern Brazil, 2017-2018.
| Variables                      | Prevalence of hypertension (%) | *PR   | **95% CI          |
|-------------------------------|--------------------------------|-------|------------------|
| **Sociodemographic**          |                                |       |                  |
| Age (years)                   |                                |       |                  |
| 18-29                         | 20.4                           | 1.00  |                  |
| 30-39                         | 24.5                           | 1.20  | 0.91-1.58        |
| ≥ 40                          | 44.3                           | 2.18  | 1.69-2.80        |
| Race                          |                                |       |                  |
| White                         | 27.4                           | 1.00  |                  |
| Black                         | 31.8                           | 1.16  | 0.86-1.57        |
| Yellow                        | 7.1                            | 0.26  | 0.06-1.01        |
| Brown                         | 28.1                           | 1.03  | 0.79-1.33        |
| Indigenous                    | 41.2                           | 1.50  | 0.81-2.77        |
| Marital Status                |                                |       |                  |
| Single                        | 22.3                           | 1.00  |                  |
| Married or with a partner     | 31.0                           | 1.39  | 1.09-1.77        |
| Separated/Widowed             | 31.8                           | 1.42  | 0.94-2.15        |
| Family income                 |                                |       |                  |
| < 2 wages                     | 25.9                           | 1.00  |                  |
| 2 wages to < 3 wages          | 27.5                           | 1.06  | 0.82-1.37        |
| ≥ 3 wages                     | 31.8                           | 1.23  | 0.98-1.55        |
| Years of study                |                                |       |                  |
| ≥ 12                          | 26.8                           | 1.00  |                  |
| 0-8                           | 31.0                           | 1.16  | 0.86-1.55        |
| 9-11                          | 27.7                           | 1.03  | 0.79-1.35        |
| Work shift                    |                                |       |                  |
| Daytime / Nocturnal           | 28.3                           | 1.00  |                  |
| Daytime                       | 28.6                           | 1.01  | 0.79-1.29        |
| Work positions                |                                |       |                  |
| Non-manual                    | 27.8                           | 1.00  |                  |
| Manual                        | 29.1                           | 1.05  | 0.86-1.28        |
| **Lifestyle**                 |                                |       |                  |
| Alcohol abuse                 |                                |       |                  |
| No                            | 26.8                           | 1.00  |                  |
| Yes                           | 32.6                           | 1.22  | 1.00-1.48        |
| Smoking                       |                                |       |                  |
| No                            | 27.4                           | 1.00  |                  |
| Yes                           | 39.8                           | 1.45  | 1.12-1.88        |
| Fruit consumption             |                                |       |                  |
| Adequate                      | 26.2                           | 1.00  |                  |
| Inadequate                    | 29.8                           | 1.14  | 0.92-1.40        |
| Consumption of salad and raw vegetables |                |       |                  |
| Adequate                      | 29.7                           | 1.00  |                  |
| Inadequate                    | 27.7                           | 0.93  | 0.77-1.13        |
| Ultra-processed food consumption |                              |       |                  |
| No                            | 28.1                           | 1.00  |                  |
| Yes                           | 29.3                           | 1.04  | 0.86-1.27        |
| Perception of salt consumption |                               |       |                  |
| Low / Very low                | 25.8                           | 1.00  |                  |
| Adequate                      | 26.8                           | 1.04  | 0.79-1.37        |
| High / very high              | 38.8                           | 1.50  | 1.11-2.04        |
| Physical activity practice    |                                |       |                  |
| Active                        | 26.0                           | 1.00  |                  |
| Inactive                      | 33.1                           | 1.27  | 1.05-1.54        |

*PR: prevalence ratio; **CI 95%: 95% confidence interval.

Continuation table 2: Bivariate analysis of hypertension in the male working population of a municipality in
northeastern Brazil, 2017-2018.

| Variables | Health/disease | Prevalence of hypertension (%) | *PR | **95% CI |
|-----------|---------------|--------------------------------|------|---------|
| Body Mass Index |                |                                |      |         |
| Underweight /Normal weight | 19.3 | 1.00 | 1.43-2.24 |
| Overweight | 34.5 | 1.79 |         |
| Obese | 48.9 | 2.53 | 1.98-3.24 |
| Waist circumference |                |                                |      |         |
| Adequate | 22.9 | 1.00 |         |
| Increased/greatly increased | 43.9 | 1.92 | 1.59-2.32 |

*PR: prevalence ratio; **CI 95%: 95% confidence interval.

*Table 3: Multivariate analysis of hypertension in the male population of a municipality in the northeast of Brazil, 2017-2018*

| Variables | Sociodemographic | Model 1 | Model 2 | Model 3 |
|-----------|------------------|---------|---------|---------|
| Age (years) | | | | |
| 18-29 | 1.00 | 1.00 | 1.00 |
| 30-39 | 1.12 | 0.85-1.47 | 1.09 | 0.83-1.44 | 1.00 |
| ≥ 40 | 2.01 | 1.56-2.60** | 1.92 | 1.48-2.48** | 1.59 |
| Race | | | | |
| White | 1.00 | 1.00 | 1.00 |
| Black | 1.36 | 1.01-1.83* | 1.41 | 1.06-1.88* | 1.37 |
| Yellow | 0.34 | 0.09-1.30 | 0.30 | 0.08-1.18 | 0.32 |
| Brown | 1.06 | 0.81-1.38 | 1.10 | 0.85-1.41 | 1.10 |
| Indigenous | 1.64 | 0.95-2.84 | 1.68 | 0.99-2.82 | 1.65 |
| Family income | | | | |
| < 2 wages | 1.00 | 1.00 | 1.00 |
| 2 wages to < 3 wages | 1.14 | 0.88-1.47 | 1.12 | 0.86-1.44 | 1.03 |
| ≥ 3 wages | 1.26 | 1.01-1.59* | 1.22 | 0.97-1.54 | 1.08 |
| Lifestyle | | | | |
| Alcohol abuse | | | | |
| No | 1.00 | 1.00 |
| Yes | 1.24 | 1.02-1.52* | 1.13 |
| Smoking | | | | |
| No | 1.00 | 1.00 |
| Yes | 1.34 | 1.04-1.72* | 1.53 |
| Perception of salt consumption | | | | |
| Low / Very low | 1.00 | 1.00 |
| Adequate | 1.18 | 0.89-1.57 | 1.19 |
| High / very | 1.64 | 1.20-2.24*** | 1.53 |
Physical activity practice

|                | Model 1 | Model 2 | Model 3 |
|----------------|---------|---------|---------|
| Active         | 1.00    | 1.00    | 1.23    |
| Inactive       | 1.23    | 1.01-1.49* | 1.23    |

Health/disease

|                |         |         |         |
|----------------|---------|---------|---------|
| Body Mass Index|         |         |         |
| Underweight/Normal weight | 1.00    |         |         |
| Overweight     | 1.64    |         |         |
| Obese          | 2.14    |         |         |

Akaike information criterion (AIC)

|                |         |         |         |
|----------------|---------|---------|---------|
|                | 1247.599| 1236.268| 1218.612|

CI 95%: 95% confidence interval; PR: prevalence ratio.
Model 1: Adjusted among sociodemographic variables
Model 2: Adjusted between sociodemographic and lifestyle variables
Model 3: Adjusted among sociodemographic variables, lifestyle, and health/disease.
* p < 0.05; ** p < 0.001; *** p < 0.01.

Table 4: Fractions attributable to modifiable associated factors among those exposed in a male working population of a municipality in northeastern Brazil, 2017-2018.

| Variables                           | Attributable fraction (%) |
|-------------------------------------|---------------------------|
| Alcohol abuse                       |                           |
| Yes                                 | 7.15                      |
| Smoking                             |                           |
| Yes                                 | 3.32                      |
| Perception of salt consumption      |                           |
| High / very high                    | 9.60                      |
| Physical activity practice          |                           |
| Inactive                            | 7.78                      |
| Body Mass Index                     |                           |
| Overweight                          | 18.60                     |
| Obese                               | 13.08                     |
Abbreviation List

Cardiovascular Diseases (CVD)
Blood Pressure (BP)
World Health Organization (WHO)
International Physical Activity Questionnaire (IPAQ)
Brazilian Classification of Occupations (CBO)
Physical Activity (PA)
Body Mass Index (BMI)
Akaike Criterion (AIC)
Attributable Fraction (PAF)
Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES)