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Research Article

Cardiovascular Diseases among Agro-Allied Company Workers in Nigeria: A Case Control Study

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Mortality arising from cardiovascular diseases among the workforce in developing countries has been reported to be about twice as high as the mortality in developed countries and tends to occur much earlier than in the developed countries. A nested case-control study design was employed. The mean age of the respondents was 34 ± 9.7 years. The respondents were mostly males (90.6%), 65.1% were married and 83.1% were of the Yoruba ethnicity. Majority of the respondents (67.3%) were Christians and 83.7% had secondary education and above. Age, marital status, salary grade and religion were statistically associated with CVD status (p < 0.05). Being an office worker, earning the lowest income, being less than 50 years of age were significant predictors of CVD risk factors (p<0.05). Educational and behavioural intervention need to be implemented to encourage adoption of healthy lifestyle so as to reduce the cardiovascular risk factors among workers.

Keywords: *Cardiovascular diseases, Risk factors, Workplace, Association, Nigeria*

INTRODUCTION

Cardiovascular diseases (CVDs) are diseases of heart and blood vessels of which atherosclerosis is the major underlying pathological process (WHO, 2010). The influence of urbanization, industrialization, affluence, increase in sedentary types of occupation, high risk dietary habits and increasing deployment of motorized transport are becoming evident in cities in developing countries (BeLeue *et al*., 2009). These lifestyle factors are found to be higher among working age groups (Gersh *et al*., 2010). Cardiovascular risk factors are rapidly expanding from original list of the so called traditional factors such as tobacco use, high blood pressure, diabetes and cholesterol (Wang *et al*., 2006). The major CVDs include, coronary heart disease (heart attack), hypertension, heart failure, rheumatic heart disease, and cerebrovascular diseases (stroke), peripheral vascular diseases, congenital heart disease and cardiomyopathies (WHO, 2010). Cardiovascular diseases are associated with several modifiable risk factors and modification of these risk behaviours is the key to preventing and reducing the burden of CVDs and their complications (BeLeue *et al*., 2009; Gersh *et al*., 2010).

Initially, the attention of researchers and policy makers in Sub-Saharan Africa has been on infectious diseases and the meagre healthcare resources are overwhelmed by other health priorities (Fuster *et al*., 2007). Cardiovascular diseases account for 3.3 times the mortality caused by all infectious diseases combined globally (Gersh *et al*., 2010; Fuster *et al*., 2007).

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Mortality arising from cardiovascular diseases among the workforce in developing countries has been reported to be about twice as high as the mortality in developed countries (Mayor, 2004) and tends to occur much earlier than in the developed countries (Gersh *et al*., 2010; Fuster *et al*., 2007). Without greater attention to prevention, it has been estimated that by 2030 CVDs and diabetes will account for 4 in 10 deaths among adults in low and middle income countries compared with 1 in 8 in high income countries (Leeder, 2004). In developing countries, the increase in CVD burden is majorly as a result of an increase in the prevalence of its risk factors and a relative lack of access to various interventions used to achieve success in developed countries (Sani *et al*., 2010).

Nigeria is in a period of epidemiological transitions with increasing proportion of the working population. There is evidence that cardiovascular risk factors are on the increase among the workforce in Nigeria (Adegun and Konwea, 2009). A study of workers in three tertiary institutions in Ekiti State, South West Nigeria, reported a high prevalence of hypo-kinetic disorders attributable to the low physical activity their work entailed (Adegun and Konwea, 2009). Globally, about 90% of CVDs are attributed to certain cardiovascular risk factors (Steyn, 2005) but these risk factors are yet to be duly explored in Nigeria, especially among agro-allied workers. It is evident that cardiovascular diseases are becoming public health threats in productive age group of low and middle income countries (Gersh *et al*., 2010; Fuster *et al*., 2007; Adegun and Konwea, 2009). Hence, efforts are needed to characterize the cardiovascular risk factors that determine the CVDs among workers in Nigeria. The objective of this study was to determine the associated cardiovascular risk factors among the agro-allied workers of CHI Limited, Ajanla Farms in Ibadan, Oyo State, Nigeria. The study also aimed to determine the effects of job conditions and predictors of cardiovascular diseases among the agro-allied workers.

MATERIALS AND METHODS

Study location

The study location was Ajanla Farms, CHI Limited, Ibadan, Oyo state Nigeria.

Study population

The study population consisted of 528 workers from different ethnic groups in Nigeria, neighbouring West African countries and Asia. A total 510 workers who were full time staff were included in the study. Workers who had spent less than six months on the job and who were mainly daily paid workers met the exclusion criteria and were not included in the study.

Study design

This study used a nested case-control study design. An initial cross-sectional descriptive survey of workers of Ajanla Farms was carried out to find out those with cardiovascular risk factors. Further exploration of the influence of job conditions on the cardiovascular risk factors was done using the case - control design. The cohort consisted of the workers of Ajanla Farms in Ibadan who had spent at least 6 months in the farms as at April 2011 when the study was conducted. Those found to have cardiovascular risk factors at the end of data gathering in end of May 2011 constituted the cases and controls arose from workers without cardiovascular risk factors.

Case–control categorisation

Cases were identified using the responses from the cross-sectional survey. Cardiovascular risk factors are both modifiable and non-modifiable factors that can result into any form of CVD. The respondents that had moderate or high cardiovascular risk factors (respondents with three or more cardiovascular risk factors) were classified as the cases and those respondents that had no risk factor and one, or two cardiovascular risk factors were classified as the controls. Cardiovascular risk factors assessed were stress, hypertension, smoking, alcohol abuse, diabetes, unhealthy diet, overweight/obesity, family history of cardiovascular diseases and physical inability (Agbana *et al*., 2016). Approximately 33% of the respondents met the criteria of being classified as cases and 67% were the controls. The cases and controls were matched based on their ages, gender and years spent working on the farm.

Data collection/study instrument

Data collection was done using an interviewer-assisted questionnaire which was developed by using the WHO STEPwise approach to chronic disease risk surveillance (WHO, 2008). Two nurses (trained for the purpose of this research) and the principal researcher served as data collectors. Following written consent duly signed, the questionnaire was administered to each respondent. The questionnaire contained three sections. Section A was on socio-demographic characteristics such as age, sex, occupation, religion, department, education and income. The income was categorised into five salary grades. Grades A = N20,000 – N 30,000; B = N 31,000 – N 50,000; C = N51000 – N70,000; D = N71,000 – N100,000; and E = N101,000 and above. Section B was on awareness about cardiovascular risk factors such as alcohol, tobacco use, and physical inactivity. Section C was on job conditions. The questionnaire and the consent form were translated into Yoruba and translated back to English to ensure conformity with the intended questions. The study instrument was pre-tested among 20 selected workers of Zartec Industry, a similar agro-allied industry in Ibadan

following which ambiguous questions were rephrased and the flow of questions modified.

Ethics

Ethical approval was obtained from the Ethical Committee of the Ministry of Health Oyo State. The General Manager of CHI LTD, Ajanla Farms also gave permission to carry out the study. Written informed consent was obtained from each respondent before the study was conducted. The rights to decline or withdraw from the study at any stage were clearly spelt out to the respondents.

Statistics

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 16. Descriptive statistics were presented with the aid of tables in frequencies, percentages, and means with their standard deviations. Inferential statistics to test for associations were conducted using Chi-square test and binary logistic regression and were presented with their chi square statistics**,** p values and odds ratio with their 95% confidence intervals. A variable selection process was conducted using a simple logistic regression to select the important variables to be included in the final logistic model. Ten variables were selected and a multivariate binary logistic regression analysis was conducted to determine the significant predictors of CVDs while controlling for confounders. The 10 variables selected were also checked for the possibility of multicollinearity and interaction. The 10 variables were gender, age group, marital status, level of education, job category, shift work, salary grade level, job stress, work duration and awareness of cardiovascular risk factors.

RESULTS

Out of 528 questionnaires administered, 523 were retrieved giving a response rate of 99.10%. However, 13 of these were found to have incomplete information on key variables of interest and were discarded, which left 510 questionnaires for analysis. The socio-demographic characteristics of respondents are shown in Table 1. The mean age of the respondents was 34 ± 9.7 years. The respondents were mostly males (90.6%), 332 (65.1%) were married and 424 (83.1%) were of the Yoruba ethnicity. Majority of the respondents (67.3%) were Christians and 83.7% had secondary education and above.

Table 1: Socio-demographic characteristics of respondents

Variables	N (%)
Age (years)	
< 30	192 (37.6)
30 – 39	182 (35.7)
40 – 49	92 (18.0)
50 – and above	44 (8.6)
Gender	
Male	462 (90.6)
Female	48 (9.4)
Religion	
Christianity	343 (67.3)
Islam	166 (32.5)
Buddhism	1 (0.2)
Level of education	
No formal	7 (1.4)
Primary	76 (14.9)
Secondary	276 (54.1)
Tertiary	138 (27.1)
Post graduate	13 (2.5)
Marital Status	
Married	332 (65.1)
Single	175 (34.3)
Others(separated, divorced)	3 (0.6)
Ethnicity	
Yoruba	424 (83.1)
Igbo	41 (8.0)
Hausa	4 (0.8)
Others	19 (3.7)
Foreigners	22 (4.3)

Comparisons of cases and controls by socio-demographic characteristics

Table 2 shows the cross tabulations of socio-demographic characteristics between cases and controls. Age, marital status and religion were statistically different between cases and controls ($p<0.05$) but gender and ethnicity of respondents were not significantly different between cases and controls ($p>0.05$).

Comparison of cases and controls by other variables

Table 3 shows that only salary grade was statistically associated with CVD status ($p<0.05$) but the respondents' awareness of cardiovascular risk factors and level of education of respondents were not significantly associated.

Table 2: Comparison of cases and controls by selected socio-demographic variables

Variables	Cases (n=169) N (%)	Controls (n=341) N (%)	χ^2	P
Gender				
Male	151 (32.7)	311 (67.3)	0.455	0.300
Female	18 (37.5)	30 (62.5)		
Age				
<30	49 (25.5)	143 (74.5)	18.753	<0.001*
30-39	63 (34.8)	118 (65.2)		
40-49	30 (32.6)	62 (67.4)		
50 and above	27 (60.0)	18 (40.0)		
Marital status				
Married	122 (36.7)	210 (63.3)	5.594	0.011*
Not married	47 (26.4)	131 (73.6)		
Ethnicity				
Yoruba	139 (32.8)	285 (67.2)	0.142	0.397
Others	30 (34.9)	56 (65.1)		
Religion				
Christianity	123 (35.9)	220 (64.1)	3.505	0.037*
Islam	46 (27.5)	121 (72.5)		

***Significant at p<0.05**

Table 3: Comparison of cases and controls by other variables

Variables	Cases (n=169) N (%)	Controls (n=341) N (%)	χ^2	p
Awareness				
Awareness of cardiovascular risk factors	102 (33.7)	201 (66.3)	0.093	0.418
Low/no awareness of cardiovascular risk factors	67 (32.4)	140 (67.6)		
Level of education				
No formal education	0 (00.0)	7 (100)	1.788	0.116
Primary	29 (37.7)	48 (62.3)		
Secondary	84 (30.4)	192 (69.6)		
Tertiary	51 (37.0)	87 (63.0)		
Post graduate	5 (34.5)	8 (61.5)		
Salary grade				
Grade A	84 (28.6)	210 (71.4)	8.855	0.006*
Grade B	25 (36.8)	43 (63.2)		
Grade C	27 (38.0)	44 (62.0)		
Grade D	24 (39.3)	37 (60.7)		
Grade E	9 (56.3)	7 (43.7)		

***Significant at p<0.05**

Table 4: Effect of job conditions on cardiovascular diseases

Exposures Variables	Cases (n=169) N (%)	Controls (n=341) N (%)	OR (95%CI)
Shift work			
Not on shift	89 (32.1)	188 (67.9)	1.11 (0.76-1.60)
On shift	80 (34.3)	153 (65.7)	
Perceived job Stress			
Not stressed	102 (35.8)	183 (64.2)	0.76 (0.52-1.11)
Stressed	67 (29.8)	158 (70.2)	
Job nature/ category			
Field work	106 (29.0)	258 (71.0)	0.52 (0.34-0.80)*
Office work	63 (43.2)	83 (56.8)	
Work duration			
<10yrs	142 (84.0)	301 (67.9)	1.43 (0.84-2.42)
>10yrs	27 (16.0)	40 (59.7)	

***Significant at p<0.05**

Effect of job conditions on cardiovascular risk factors

Table 4 shows the odds of CVD in relation to certain exposures. Shift work, job stress and work duration did not significantly increase the risk of having cardiovascular risk factors. However, only job nature/category (being a field worker) significantly reduced the odds of cardiovascular risk (OR = 0.52 (0.344-0.796)).

Table 5: Predictors of cardiovascular diseases

Variables	AOR	95%CI	P value
Gender			
Male	0.847	0.422-1.699	0.639
Female	1		
Job category			
Office worker	1.759	1.105-2.799	**0.017***
Field worker	1		
Shift work			
No	0.718	0.471-1.094	0.123
Yes	1		
Salary grade level			
Grade A	0.209	0.049-0.889	**0.034***
Grade B	0.269	0.061-1.186	0.083
Grade C	0.336	0.086-1.315	0.117
Grade D	0.330	0.087-1.256	0.104
Grade E	1		
Level of Education			
No formal education	0.000	0.000	0.999
Primary Education	1.605	0.345-7.470	0.547
Secondary Education	1.432	0.335-6.120	0.628
Tertiary Education	1.187	0.294-4.797	0.810
Postgraduate Education	1		
Job stress			
Absent	1.083	0.712-1.646	0.709
Present			
Work duration			
< 10 years	1.344	0.671-2.693	0.405
≥ 10 years	1		
Marital status			
Married	0.953	0.516-1.760	0.878
Not married	1		
Awareness of cardiovascular risk factors			
Low/no awareness	1.199	0.774-1.858	0.416
High awareness	1		
Age groups			
<30	0.261	0.101-0.676	**0.006***
30-39	0.367	0.164-0.818	**0.014***
40-49	0.273	0.118-0.635	**0.003***
≥50	1		

***Significant at p<0.05**

Predictors of cardiovascular diseases

Multivariate analysis using logistic regression as shown in Table 5 shows the adjusted odds for personal and job characteristics associated with being a case (moderate/high cardiovascular risk). The analysis shows that being an office worker is a predictor of cardiovascular risk factors as being office workers increased the odds of being a case by 1.8 times compared to those who were field workers. Workers on salary grade level A are 0.2 times protected from CVD than workers on salary grade E. Younger workers had lesser risk than those aged 50 and above. As the levels of education increased so was the increase in the risk of CVD.

DISCUSSION

Associated factors

Age is a non-modifiable risk factor of CVD and the risk of cardiovascular diseases rises with advancing age in most population. In our study, age was significantly associated with the risk level of cardiovascular diseases (p<0.001). Sixty percent of those aged 50 years and above had three or more risk factors of CVD compared to 25.5%, 34.8% and 32.6% among those aged <30 years, 30 – 39 years and 40 – 49 years respectively. A study conducted among 15,079 Hispanic/Latino individuals living the US showed that 43.1% of those aged 65 – 74 years had ≥3 CVD risk factors compared to 26.8% and 8.9% among individuals aged 45 – 64 years and 18 – 44 years respectively (Daviglus *et al*., 2012). The association was also found to be statistically significant. In a study of cardiac risk indices of staff of the Federal University of Technology Owerri, Imo State, Nigeria, senior staff had a significantly higher risk of developing CVDs because a greater percentage were older than the junior staff who were generally younger (Emerole *et al*., 2007). Marital status was significantly associated with the risk level of cardiovascular diseases. Married individuals had more CVD risk factors than unmarried individuals. This may not likely be as a result of

their married status but could be as a result of age as majority of those that were married were older compared to those who were not yet married.

Gender was not significantly associated with the risk level of cardiovascular diseases. Traditionally, CVD has been termed a man's disease, but this notion is changing as studies are now showing that CVD kills as many women as men (Schenck-Gustafsson, 2008). Our findings show that 37.5% of cases were females while 32.7% were males. Similarly, in Europe, 23% of women versus 21% of men and 18% of women versus 11% of men die of ischemic heart disease and stroke respectively (WHO, 2016). The paradigm shift is said to be likely due to higher female life expectancy and also, some CVD risk factors are unique to women. These include older age at presentation, premature menopause, gestational diabetes, hypertension, preeclampsia during pregnancy and polycystic ovarian syndrome (Schenck-Gustafsson, 2008). Ethnicity was not significantly associated with the risk level of cardiovascular diseases. There was no significant difference in the prevalence of CVD risk factors between the major ethnic group (Yoruba) and other ethnic groups. Mooteri *et al* (2004) in their study in the US also found no racial association, however they identified migration and adoption of Western lifestyles to be associated with development of risk factors and CVD among ethnic groups. The level of awareness of the risk of factors of CVD was not associated with the CVD status of the respondents. Though many (66.3%) of those with low risk of CVDs had a high level of awareness of the risk factors of CVD compared to those with high risk of CVD (33.7%), however, this was not statistically significant.

The educational levels of the respondents in our study were not associated with their CVD status though the highest prevalence (37.7%) was observed among those that had primary education as their highest educational level. The findings of our study are similar to that of Daviglus *et al* (2012) where the highest prevalence was observed among those with less than a high school academic qualification. However, their study found a significant association between education and CVD risk factors level. It has been reported that men of lower socioeconomic status have the highest risk of excess mortality rates (Plavinsky *et al*., 2003). This is because the poor tend to abuse some of the risk factors of CVD such as smoking and alcohol use. They also experience more difficulties getting access to good health care services unlike those with higher socioeconomic status (Petrukhin and Lunina, 2012). The socioeconomic status of the respondents identified by their salary grades was significantly associated with their CVD status. Among the cases, those who earn low income were less likely to have more CVD risk factors than those who earn high income. Deshpande and Dixit (2008) in their study also found a significant association between upper socioeconomic status and occurrence of acute myocardial infarction.

Effect of job conditions on cardiovascular diseases

The nature of the job the respondents were engaged in was found to be significantly associated with the risk of CVDs. Those who work on the field were less likely to develop CVD compared to those who work in the office. Another study also reported that light (sedentary) occupational physical activity increases the risk of acute myocardial infarction (Deshpande and Dixit, 2008). Working shifts has also been found to play a role in the occurrence of CVD. Unlike many other studies, Puttonen *et al* (2012) did not find a higher prevalence of metabolic syndrome among night-shift workers compared to day workers. However, they found the occurrence of metabolic syndrome to be higher among men who were former shift workers but same was not observed among women. No plausible explanation could be given as regards the gender difference observed, hence, the need for more studies to confirm this observation. In this study, the job condition that influenced cardiovascular risk factors was the job nature/category. Being a sedentary worker and advanced in age increased the risk for cardiovascular diseases. This compares with studies in a Nigerian university where the senior staff who were older and less mobile than the junior staff had significantly high risk of cardiovascular diseases (Emerole *et al*., 2007). Some other studies have also found significant associations between, work duration, job strain/stress and cardiovascular risk factors in contrast to the findings of this study (Pimenta *et al*., 2012). It has been established that work conditions are likely sources of cardiovascular risk factors and employers of labour should take note of them in order to ensure improved productivity at work.

Predictors of Cardiovascular diseases

Those who work in the office were 1.759 times more likely to be at risk of developing CVD compared to those who work in the field. This is evident in the fact that office workers are more likely to engage in a sedentary lifestyle compared to those who are field workers. Deshpande and Dixit (2008) in their study found out that workers who engage in sedentary occupational physical activity are 2.21 times more likely to develop acute myocardial infarction than those who engage in heavy occupational physical activity. Studies have identified lack of physical activity as a significant predictor of CVD (Frah and Naeem, 2016). Occupational stress is defined as the perceived imbalance between job demands and an individual's ability to work most especially when the inability leads to important consequences (Mirmohammadi *et al*., 2014). We also found out in our study that not being stressed is a protective factor. Recent investigations now focus on detection of cardiovascular risk factors in certain jobs. Earning a very low income (N20,000 – N 30,000) was found in our study to be protective. The lowest earners were 0.209 less likely to develop CVD risk factors compared to the highest earners (N101,000 and above).

In our study, we also found out that being less than 30 years old (p=0.006), between 30 – 39 years old (p=0.014) and between 40 – 49 years old (p=0.003) were significant predictors of CVD risk factors. These age groups were less likely to have high risk of CVDs compared to those that are 50 years old and above.

The limitations of this study include those associated with the study design such as inability to establish causal relationship and recall bias. However, in spite of these limitations, this study provides insight into the cardiovascular risk profiles among workers and also raises a pertinent concern about the future health of workers who are engaged in this particular job.

CONCLUSIONS

This study found out that being an office worker, earning the lowest income, being less than 50 years of age were significant predictors of CVDs. Workplace environment can be an important place for health promotion and disease prevention if properly utilized by employing practical preventive measures in communicating awareness of behavioural change for the prevention of cardiovascular risk factors. Therefore, education needs to be intensified in this workplace to encourage adoption of healthy lifestyle so as to reduce the cardiovascular risk factors among the workers. The findings of this study can also serve as a template for a community-based study in Nigeria.

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REFERENCES

Adegun JA, Konwea EP. (2009). The prevalence of hypokinetic disorders among workers of tertiary institutions in Ekiti State Nigeria. Nebula. 6(2): 177 – 186.

Agbana RD, Asuzu MC, Fasoro AA, Owoeye OO. (2016). Awareness and Prevalence of Cardiovascular Risk Factors among Workers in an Agro-allied Company in Nigeria. IOSR J Dent and Med Sci 15(9): 122-127.

BeLeue R, Okoror TA, Iwelunmor J, Taylor KD, Degboe AN, Agyemang C, Ogedegbe G. (2009). An overview of cardiovascular risk factor burden in sub-Sharan African countries: a socio-cultural perspective. Global Health. 5(10): 5 – 10. https://doi.org/10.1186/1744-8603-5-10

Daviglus ML, Talavera GA, Avilés-Santa ML, Allison M, Cai J, Criqui MH, Gellman M, Giachello AL, Gouskova N, Kaplan RC, LaVange L. (2012). Prevalence of major cardiovascular risk factors and cardiovascular diseases among Hispanic/Latino individuals of diverse backgrounds in the United States. JAMA. 308(17): 1775 – 84. https://doi.org/10.1001/jama.2012.14517

Deshpande JD, Dixit JV. (2008). Risk factors for acute myocardial infarction: a hospital based case control study. Health Pop-Persp Iss. 31(3): 164 – 169.

Emerole CO, Aguwa EN, Onwasigwe CN, Nwakoby BA. (2007). Cardiac risk indices of staff of Federal University of Technology Owerri, Imo State, Nigeria. Tanzan Health Bull. 9(9): 132 – 135. https://doi.org/10.4314/thrb.v9i2.14316

Frah EAM and Naeem MAM. (2015). Investigation risk factors of cardiovascular disease in Khartoum state, Sudan: case - control study. Intl J Sci Res. 2016; 5(3): 1593 – 1595. https://doi.org/10.21275/v5i3.nov162185

Fuster V, Voute J, Hunn M, Smith SC. (2007). Low priority of cardiovascular and chronic disease in the global health agenda: a case for concern. Circulation. 116: 1966 – 1970. https://doi.org/10.1161/circulationaha.107.733444

Gersh BJ, Sliwa K, Mayosi BM, Yusuf S. (2010). The epidemic of cardiovascular disease in the developing world: global implications. Euro Heart J. 31: 642 – 648. https://doi.org/10.1093/eurheartj/ehq030

Leeder S, Raymond S, Greenberg H, Liu H, Esson K. (2004). Race against time: The challenge of cardiovascular disease in Developing Countries. New York: Trustees of Columbia.

Mayor S. (2004). Cardiovascular disease threatens the developing countries. BMJ. 328: 1032 - 1041. https://doi.org/10.1136/bmj.328.7447.1032-b

Mirmohammadi SJ, Taheri M, Mehrparvar AH, Heydari M, Kanafi AS, Mostaghaci M. (2014). Occupational stress and cardiovascular risk factors in high-ranking government officials and office workers. Iran Red Crescent Med J. 16(8): e11747. https://doi.org/10.5812/ircmj.11747

Mooteri SN, Petersen F, Dagubati R, Pai RG. (2004). Duration of residence in the United States as a new risk factor for coronary artery disease (The Konkani Heart Study). Am J Cardiol. 93(3): 359 – 361. https://doi.org/10.1016/j.amjcard.2003.09.044

Petrukhin IS, Lunina EY. (2012). Cardiovascular disease risk factors and mortality in Russia: challenges and barriers. Pub Health Rev. 33(2): 436 – 49.

Pimenta AM, Kac G, e Souza RR, Ferreira LM, de Fátima Silqueira SM. (2012). Night Shift work and cardiovascular risk among employees of a public university. Rev. Assc. Med. Bras., 581(2): 168 – 177. https://doi.org/10.1016/s2255-4823(12)70177-7

Plavinsky SL, Plavinskaya SI, Klimov AN. (2003). Social factors and increases in mortality in Russia in the

1990s: prospective cohort study. BMJ. 326: 1240-2. https://doi.org/10.1136/bmj.326.7401.1240
Puttonen S, Viitasalo K, Härmä M. (2012). The relationship between current and former shift work and the metabolic syndrome. Scand J Work Environ Health. 38(4): 343 –348. https://doi.org/10.5271/sjweh.3267
Sani MU, Wahab KW, Yusuf BO, Gbadamosi M, Johnson OV, Gbadamosi A. (2010). Modifiable cardiovascular risk factors among apparently healthy adult Nigerian population – a cross sectional study. BMC Res Notes. 3(1):11. https://doi.org/10.1186/1756-0500-3-11
Schenck-Gustafsson K. (2008). How do gender differences affect cardiovascular risk factors? Dial Card Med. 2008; 13(2): 120 – 126. https://doi.org/10.1016/s1550-8579(08)00092-2
Steyn K. (2005). Risk factors associated with myocardial infarction in Africa. The INTERHEART Africa study. Circulation. 112(23): 3536 – 40. https://doi.org/10.1161/circulationaha.105.563452
Wang TJ, Gona P, Larson MG, Tofler GH, Levy D, Newton-Cheh C, Jacques PF, Rifai N, Selhub J, Robins SJ, Benjamin EJ. (2006). Multiple biomarkers for the prediction of first major cardiovascular events and deaths. N. Engl J Med. 355(25): 2631 – 2640. https://doi.org/10.1056/nejmoa055373
World Health Organization. (2008). STEPS fact sheet. Brazzaville: WHO AFRO.
World Health Organization (2010). Noncommunicable Disease Surveillance. http://www.who.int/ncd_surveillance/en/ Accessed June 6, 2010.
World Health Organization (2016). Global Health Observatory (GHO) data. 2016. http://www.who.int/gho/en/ Accessed July 7, 2016.

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