

## **Awareness and Prevalence of Cardiovascular Risk Factors among Workers in an Agro-allied Company in Nigeria**

Richard Dele Agbana<sup>1\*</sup>, Michael Chiemeli Asuzu<sup>2</sup>,  
Ayodeji Akinwande Fasoro<sup>1</sup>, Olubayode Oludiya Owoye<sup>1</sup>

<sup>1</sup>Department of Community Medicine, College of Medicine and Health Sciences, Afe Babalola University Ado-Ekiti, Nigeria

<sup>2</sup>Department of Community Medicine, University College Hospital, Ibadan, Nigeria

\*Dr Richard Dele Agbana, richardagbana@yahoo.com. Department of Community Medicine, College of Medicine and Health Sciences, Afe Babalola University Ado-Ekiti, P.M.B. 5454 Ado-Ekiti, Ekiti State, Nigeria.

---

**Abstract:** Cardiovascular diseases have significantly increased in the last century becoming the leading cause of morbidity and mortality globally. Work, worksite situations and practices are known to influence cardiovascular risk factors, hence the aim of this study to assess the awareness and prevalence of cardiovascular risk factors among workers in an agro-allied industry in Nigeria. A descriptive cross sectional survey was carried out to find out those with cardiovascular risk factors. Data were collected using an interviewer-assisted questionnaire developed using the WHO STEPwise approach to chronic disease risk surveillance. The mean age of the respondents was  $34 \pm 9.7$  years. More than half 303 (59.4) of the respondents had high awareness of cardiovascular risk factors. Of the risk factors of cardiovascular diseases, 6.9% were current daily smokers, 15.1% abuse alcohol, 89.8% engaged in unhealthy diet, 66.5% do not engage in moderate/vigorous physical activities, 14.5% had family history of cardiovascular diseases, 17.8% were overweight/obese and 37.1% were hypertensive. Overall, 64.5% of the respondents were classified as having low risk of developing cardiovascular diseases while about 30.4% had moderate risk and 2.7% had high risk. We recommend that health education regarding cardiovascular diseases risk factors be delivered periodically.

**Keywords:** Awareness, Cardiovascular diseases, Nigeria, Prevalence, Risk factors

---

### **I. Introduction**

In the last century, cardiovascular diseases have increased from relatively minor diseases to being the leading cause of mortality and morbidity globally [1, 2]. Cardiovascular diseases risk factors accounted for less than 10% of global mortality at the beginning of the 20th century, and by the beginning of the 21st century, they accounted for nearly 50% of all mortality in the developed world and about 25% in the low and middle income countries [1, 2]. Cardiovascular diseases are major cause of loss of productivity in adults globally [2, 3]. Sub-Saharan Africa is experiencing rapid epidemiological transitions characterized by changing lifestyle factors and increasing urbanization which have resulted in the increased occurrence of cardiovascular diseases [3, 4]. Due to the dual burden of lingering communicable diseases and emerging non-communicable diseases in this region, non-communicable diseases including cardiovascular diseases have not received the needed attention to initiate control efforts [5]. Over the last 20 years, cardiovascular mortality rates have declined in many high income countries but have increased in low and middle income countries [3] and the percentage of premature deaths from cardiovascular diseases range from 4% in high income countries and about 42% in low and middle income countries [6].

The major cardiovascular diseases share a number of dietary and other modifiable behavioural risk factors, which include high dietary fat, low intake of vegetables and fruit, alcoholism, physical inactivity, tobacco use, and stress [7]. Risk factors are usually identifiable prior to the development of the diseases and often coexist and interact with one another and can be modified by intervention or controlled, thereby reducing the possibility of the occurrence of diseases [8]. Cardiovascular risk factors are classified into three main groups: non-modifiable risk factors namely gender, age, ethnicity and family history of cardiovascular diseases; modifiable risk factors namely obesity, diabetes, hypertension, decreased high density lipoprotein (HDL) and elevated low density lipoprotein (LDL); and behavioural risk factors namely alcohol abuse, tobacco use, dietary cholesterol, saturated fat, high salt intake, physical inactivity and stress [7, 9]. 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 [9].

In low and middle-income countries like Nigeria, cardiovascular risk factors tend to be concentrated in urban areas and their prevalence is increasing in tandem with the rising globalisation of the food, tobacco and alcohol industries [7]. Although the World Health Organization (WHO) estimates that over 70% of

cardiovascular disease deaths are attributable to small number of cardiovascular risk factors [10]. Studies project that the mortality due to cardiovascular diseases, will be approximately three-fold higher as the epidemic is rising in low and middle income countries than the developed world [3, 11]. In China, between 1973 to 2005 mortality from non-communicable diseases increased while that due to communicable disease declined [12]. Most low and middle income countries have no established monitoring system for cardiovascular risk factors which makes it impossible to have detailed information and monitor trends [13].

Work, worksite situations and practices have been known to influence cardiovascular risk factors [14]. A study conducted in a developing country in 2010 indicated that as high as 68% of working adults were affected with lifestyle diseases [15]. Several studies have identified cardiovascular risk factors which are workplace specific as well as cardiovascular risk factors which are common in the general population. A study demonstrated that heart disease was more common among the drivers of London's double decker buses than the conductors, as the latter spent the day going up and down stairs [16]. Another study showed that coronary heart disease was less common among mail men who delivered letters than among postal workers in the administrative positions [16]. The prevalence of hypertension among office workers and factory workers in Sudan was found to be 17.8% and 7% respectively [17]. Occupation-related stress has also been considered to be a potentially important risk factor and consequently a bulk of recent studies has focused on the detection of cardiovascular risk factors in certain employment [18]. This study aimed to assess the awareness and prevalence of cardiovascular risk factors among workers in an agro-allied industry in Ibadan, Oyo State, Nigeria.

## **II. Methodology**

### **2.1 Study area**

This study was carried out in Ajanla Farms, CHI Limited, located on the outskirts of Ibadan City 20 kilometres along Lagos – Ibadan Expressway in South-West Nigeria. It was established in 1986 on over hundred hectares of land. Apart from farm houses, stores, and hostels for those on training, there are few residential buildings within the farm premises.

### **2.2 Study population**

Workers of Ajanla Farms Ibadan were the study population. The factory records showed the staff strength as at April 2011 to be 528 workers. Daily paid workers who were not in the employment of the Farms for six consecutive months were excluded from the study. The total population sampled was 510 workers.

### **2.3 Study design**

A descriptive cross sectional survey was carried out to find out those with cardiovascular risk factors. All consenting workers present at the time of the study were interviewed and examined. Return visits were done for workers who were absent at the initial visit.

### **2.4 Data collection/study instrument**

Data were collected using an interviewer-assisted questionnaire developed using the WHO STEPwise approach to chronic disease risk surveillance. The STEPS is a sequential process of gathering comparable and sustainable risk factor information on non-communicable diseases [19]. The STEPS surveillance approach is based on the concept that non-communicable surveillance system needs to be simple, focusing on minimum number of risk factors that predicts disease [19]. The questionnaire for the study consisted of four sections: section A was on socio-demographic characteristics such as age, sex, occupation, religion, department, education and income; section B was on awareness about cardiovascular risk factors such as alcohol, tobacco use, and physical inactivity; section C was on prevalence of cardiovascular risk factors such as tobacco use, alcohol intake, physical inactivity, fruit/vegetable intake, high blood pressure and diabetes; and Section D was on physical examination findings such as weight, height and blood pressure. Each respondent was seated for at least 10 minutes to eliminate the "white coat effect" before taking their blood pressure reading. Two consecutive blood pressure readings from the left arm of each respondent were taken at intervals of 15 minutes and the average recorded. Korotkoff phase I was taken as systolic and Korotkoff phase V as diastolic blood pressure. The blood pressure was measured in mmHg using the left arm with the respondent in the sitting position with the arm rested on a table such that the middle of the arm was about the level of the heart and with the aid of a mercury sphygmomanometer [Accouson standard with adult cuff 12.5 cm.] using the auscultation method [20]. Elevated systolic blood pressure of and above 140 mmHg and or elevated diastolic blood pressure of and above 90 mmHg from the average of two readings or those who were known hypertensives on treatment were considered hypertensive. The height and weight measurements were taken using a wooden meter rule and a portable bathroom weighing scale respectively. Body Mass Index (BMI) between 25 – 29.9kg/m<sup>2</sup> and >30.0kg/m<sup>2</sup> were considered overweight and obese respectively [21].

**2.5 Ethics**

Ethical approval for the study was obtained from the Ethical Committee of the Ministry of Health Oyo State. Permission to carry out the study was obtained from the General Manager of CHI LTD, Ajanla Farms. Written informed consent was obtained from each respondent before the study. Respondents were informed of their rights to decline or withdraw from the study at any stage without adverse consequences. Privacy was ensured as each respondent was examined individually in a consulting room with the door closed.

**2.6 Data analysis**

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 16. Descriptive statistics were presented in frequencies, percentages, means with their standard variations with the aid of tables and charts.

**III. Results**

**3.1 Sociodemographic characteristics of respondents**

The response rate for the study was 96.6%. Table 1 shows the socio-demographic characteristics of respondents. The mean age of the respondents was 34 ± 9.7 years. Majority of the workers were less than 40 years of age, males (90.6%), married (65.1%), Christians (67.3%) and Yoruba (83.1%) were.

**Table 1:** Sociodemographic characteristics of respondents

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

**3.2 Awareness of cardiovascular risk factors**

As shown in Table 2, more than half (59.4%) of the respondents had high awareness of cardiovascular risk factors. Stress was the most recognized cardiovascular risk factor, followed by hypertension and smoking. Majority of the workers (57.8%) got their information about cardiovascular risk factors from the media.

**Table 2:** Respondents’ awareness of cardiovascular risk factors and source of information

Risk factors	N	%
<b>Overall</b>		
High awareness	303	59.4
Low/no awareness	207	40.6
<b>Stress</b>		
Yes	342	67.1
No	168	32.9
<b>Hypertension</b>		
Yes	315	61.8
No	195	38.2

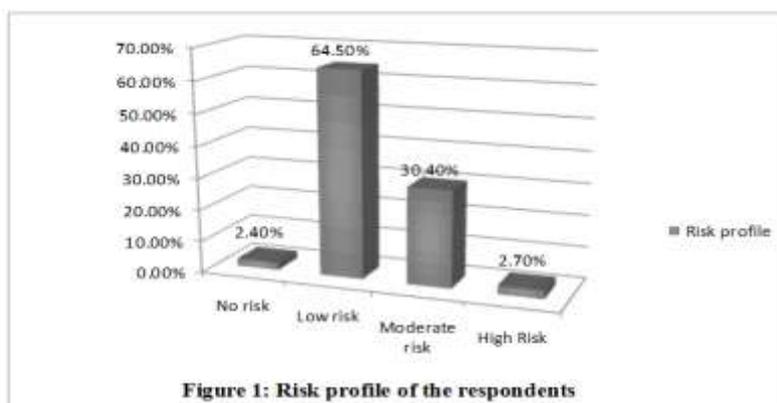
<b>Smoking</b>		
Yes	295	57.8
No	215	42.2
<b>Alcohol Abuse</b>		
Yes	292	57.3
No	218	42.7
<b>Diabetes</b>		
Yes	281	55.1
No	229	44.9
<b>Unhealthy diet</b>		
Yes	279	54.7
No	231	45.3
<b>Overweight/Obesity</b>		
Yes	279	54.7
No	231	45.3
<b>Physical inactivity</b>		
Yes	275	53.9
No	235	46.1
<b>Source of information</b>		
Media (TV, Text, Radio)	295	57.8
Friends/Relatives	196	38.6
Medical Doctors/Other Health Practitioners	177	34.6
Books/Flyers/Handbills/Bulletin	143	28.0

### 3.3 Prevalence of cardiovascular risk factors

Of the risk factors of cardiovascular diseases presented in Table 3, 6.9% were current daily smokers, 3.9% were obese and 37.1% were hypertensive. As shown in Figure 1, 2.7% of the respondents were classified as having high risk of developing cardiovascular diseases.

**Table 3:** Prevalence of cardiovascular risk factors

Risk factors	N	%
<b>Tobacco use</b>		
Current Smoker	35	6.9
Non Smoker	475	93.1
<b>Excessive alcohol use</b>		
Consumption of more than 2 drinks daily by males / more than 1 drink daily by females	77	15.1
Consumption of 2 or less drinks daily by males/ 1 or less drink daily by females	433	84.9
<b>Unhealthy diet (Quantity of fruits/vegetables)</b>		
< 5 servings	458	89.8
≥5 servings	52	10.2
<b>Physical inactivity</b>		
Moderate/vigorous physical activities arising from work or leisure for at least 30 minutes daily ≥5days/week	171	33.5
No moderate/ vigorous physical activities arising from work or leisure for at least 30 minutes daily <5 days/week	339	66.5
<b>Family history of cardiovascular diseases</b>		
Family history	74	14.5
No family history	436	85.5
<b>Body mass index (BMI)</b>		
Underweight (< 18.5 kg/m <sup>2</sup> )	26	5.1
Normal weight (18.5 – 24.9 kg/m <sup>2</sup> )	393	77.1
Overweight (25 – 29.9 kg/m <sup>2</sup> )	71	13.9
Obese (above 30kg/m <sup>2</sup> )	20	3.9
<b>High blood pressure</b>		
Blood pressure equal or greater than 140/90 mmHg	189	37.1
Blood pressure less than 140/90 mmHg	321	62.9



#### **IV. Discussion**

The awareness of cardiovascular risk factors was relatively good in this study population. Nearly 60% of the workers were highly aware of the risk factors of cardiovascular diseases. This level of awareness is better than that of previous studies among workers in various parts of Nigeria [22, 23] and that of national survey where only about a third of the respondents were aware of the risk factors for cardiovascular diseases [24]. Studies among workers in low and middle income countries reported lower levels of awareness of non-communicable diseases (NCDs) than was found in this study [25, 26]. On the other hand, studies among workers in United States of America and India have found similar high level of awareness for selected cardiovascular risk factors [27, 28]. A comparable high level of awareness among workers in the banking industry and the university community in Nigeria have also been reported [29]. The relative high level of awareness of cardiovascular risk factors from this study, could be because majority (83.7%) of the workers had secondary education and above. It has also been found that high level of knowledge and awareness of cardiovascular risk factors is associated with educational status [30].

Stress, hypertension and smoking were the most identified risk factors for cardiovascular diseases in this study. This study also showed that most of the respondents got information about cardiovascular risk factors through the media. This may be that preventive health education in the in-house clinic and hospitals has not been given much priority, since efforts are more often concentrated on curative services, as it commonly occurs in workplace clinics in Nigeria. The most prevalent risk factors identified among the workers were unhealthy diet and, physical inactivity, which were found in more than two thirds of respondents. In this study, most respondents had more than one risk factor which is similar to several other studies [25, 29, 30]. The prevalence of cardiovascular risk factors found in this study is similar to some other studies [29, 30]. This may suggest that cardiovascular risk factors are on the upward swing among workers and preventive measures should be initiated in order to curtail their associated morbidities.

Our findings showed that 37.1% of the respondents were hypertensive. This prevalence is consistent with reported prevalence among the productive age groups from different studies in Nigeria [25, 31]. Our finding was higher than those reported for workers in other parts of Nigeria [32, 33]. This is also higher compared to what was reported among workers in Spain, India and Malaysia [16, 26, 34, 35]. About 15% of the respondents reported a family history of cardiovascular disease. This figure is similar with findings among the India's bank workers [36] and industry workers [26] but different from what was observed among workers in north-east Nigeria [37]. Genetic factors are associated with cardiovascular diseases and when both parents have any of the cardiovascular risk factors or diseases, the risk of the offspring developing cardiovascular diseases increases [24]. Family history is a non-modifiable risk factor for cardiovascular diseases. Therefore, prompt and periodic medical assessment of cardiovascular risk factors of workers with positive family history of cardiovascular diseases or risk factors should be incorporated into occupational health services in workplaces so that the risk factor(s) be identified early and is/are not allowed to degenerate into cardiovascular diseases in such workers.

We therefore recommend that periodic health education regarding cardiovascular diseases risk factors and adoption of healthy lifestyle practices be instituted in workplaces. Periodic screening for cardiovascular risk factors should be instituted in workplaces and regular follow up/medical check-ups of identified workers with cardiovascular risk factors and diseases should be encouraged. We also recommend that workplace policies be instituted to address nutrition and exercise needs of workers such as; strengthening the canteen with healthy food choices most especially with fruit and vegetable, provision of recreational facilities for exercise on site especially for office workers and managerial staff to take advantage of especially during break time.

One of the limitations of this study was that the study employed a cross-sectional study design and as such causal relationships between variables cannot be established. Some of the analyses were based on self-report with the possibility of over and under reporting.

#### **V. Conclusion**

This study showed that the awareness of cardiovascular risk factors is high among the study population, inadequate fruit and vegetable intake was the most common risk factor and about one-third were at moderate and high risk of cardiovascular diseases. Cardiovascular diseases risk factors are significant public health challenges among workers. Cardiovascular diseases incapacitate workers by limiting their effectiveness which invariably affects the process of economic growth.

#### **Acknowledgements**

We wish to thank Dr O.K. Ige for her valuable suggestions and contributions during the course of the work. We appreciate Dr Olaifa Olaofe, the General Manager CHI Ltd Ajanla Farms Ibadan, Nigeria for allowing the use of his facility.

## References

- [1] Gaziano TA, Bitton A, Annand S, Abrahams-Gessel S Morphy A. Growing epidemic of coronary heart disease in low and middle income countries. *Curr Probl Cardiol.*, 2010; 35: 75 – 115.
- [2] Levenson JW, Skerrett PJ, Gaziano MJ. Reducing the global burden of cardiovascular disease: The role of risk factors. *Preventive Cardiology*, 2007; 5: 188 - 199.
- [3] Gersh BJ, Sliwa K, Mayosi BM, Yusuf S. The epidemic of cardiovascular disease in the developing world: global implications. *European Heart Journal*, 2010; 31: 642 – 648.
- [4] BeLeue R, Okoror TA, Iwelunmor J, Taylor KD, Degboe AN, Agyemang C, Ogedegbe G. An overview of cardiovascular risk factor burden in sub-Saharan African countries: a socio-cultural perspective. *Global Health*, 2009; 5 (10): 5 - 10.
- [5] Yach D, Hawkes C, Coult C, Hofman K. The global burden of chronic diseases: overcoming the impediments to prevention and control. *JAMA*, 2004; 291: 616 - 622.
- [6] Mendis S, Puska P, Norrvin B. (editors) *Global Atlas on cardiovascular disease prevention and control*. 2011, ISBN 978 92 4 156437 3.
- [7] Unwin N, Alberti GK. Chronic non-communicable diseases. *Ann Trop Med Parasitol.*, 2006; 100(5-6): 455 - 464.
- [8] Portal M, (Ed). *A dictionary of epidemiology* 5th edition edited for the International Epidemiological Association Inc. Oxford University Press Inc., 2008.
- [9] Wang TJ, Gona P, Larson MG, Tofler GH, Levy D, Newton-Cheh C, Jacques PF, Rifai N, Shehub J, Robins SJ, Benjamin EJ, D'Agustino RB, Vasan RS. Multiple biomarkers for the prediction of first major cardiovascular events and deaths. *N. Engl J Med.*, 2006; 355(25): 2631 - 2640.
- [10] World Health Organization (WHO). Impact of chronic disease in Nigeria 2006. [Accessed June 20 2009]
- [11] Mayosi B, Risher A, Lalloo U, Sitas F, Tollman S, Bradshaw D. The burden of non-communicable disease in South Africa. *Lancet*, 2009; 374: 4934 - 4947.
- [12] Steyn K, Damasceno A, (editors.) *Life Style and Related Risk Factors for Chronic Diseases*. 2nd ed. The World Bank. Geneva. 2006.
- [13] Petrukhin IS, Lunina EY. Cardiovascular disease risk factors and mortality in Russia: Challenges and Barriers. *Public Health Review*, 2012; 33: 436 – 449.
- [14] Zhou B, Li Y, Stamler J, Tao S, Davis CE, Wu Y, Liu X, Folsom AR, William OD. Relation of occupational change to cardiovascular risk factor levels in rural Chinese men:- The Republic of China – United States collaborative study on cardiovascular and cardiopulmonary epidemiology. *American Journal of Public Health*, 2003; 93 (12): 2049 - 2051.
- [15] Sharma M, Majumdar PK. Occupational lifestyle diseases: an emerging issue, *Indian J Occup Environ Med.*, 2009; 13: 109 – 112.
- [16] Artalejo FK, Banegas JR. Contribution of occupational medicine to cardiovascular medicine. *Rev Esp Cardiol.*, 2006; 59: 403 – 413.
- [17] Sherif SM, Ahmed ME, Hameida MM. Prevalence of hypertension in an urban community in Sudan. *Khartoum Medical Journal*, 2008; 1: 72 - 74.
- [18] Kivimaki M, Virtanen M, Elovainio M, Kouvonen A, Vaananen A, Vahtera J. Work stress in the aetiology of coronary heart disease – a meta-analysis. *Scand J Work Environ Health*, 2006; 32: 431 – 442.
- [19] World Health Organization: *STEPS fact sheet*. Brazzaville: WHO AFRO; 2008.
- [20] Mendis S, Lindholm LH, Mancio G, Withworth J, Alderman M, Lim S, Heagerty T: World Health Organization (WHO) and International Society of Hypertension (ISH) risk prediction charts: assessment of cardiovascular risk factors for prevention and control of cardiovascular diseases in low and middle income countries. *J Hypertens.*, 2007; 25(8): 1578 - 1582.
- [21] WHO (World Health Organization). *Obesity: preventing and managing the global epidemic*: WHO Technical Report Series 894, Geneva : WHO, 2000.
- [22] Familoni OB, Olunuga TO. Comparison in the knowledge and awareness of hypertension among hospital and factory workers in Sagamu Nigeria. *Nig Med Prat.*, 2005; 47(3): 42 – 45.
- [23] Ulasi I, Ijoma CK, Onwubere BJC, Arodwe E, Onudugo O, Okafor C. High prevalence and low awareness of hypertension in a market population in Enugu, Nigeria. *Int J Hypertens.*, 2011; doi :10.4061/2001/869675
- [24] The National Expert Committee on NCD. *Non Communicable Diseases in Nigeria*. Final Report of a National Survey, 1997.
- [25] Prabhakaran D, Shah P, Chaturvedi V, Rmakrishnan L, Manhapra A, Reddy KS. Cardiovascular risk factor prevalence among men in a large industry of northern India. *Natl Med J India*, 2005; 18(2): 59 - 65.
- [26] Mohmmedirfan MH, Desai VK, Kavishwar A. A study on the effect of lifestyle risk factors in prevalence of hypertension among white collar job people of Surat. *The Internet Journal of Occupational Health*. 2011; 1(1). DO5580/iobe.
- [27] Mozumdar A, Liquori G. Statewide study on personal risks of cardiovascular disease in women: a go red North Dakota study. *Womens Health (Lond Engl)*, 2010; 6(1): 37 – 50.
- [28] Janatia B, Anand K, Kapour SK, Pandey RM. Behaviour risk factors for non-communicable diseases among factory employees in Faridabad; Haryana. *J Med Assoc.*, 2009; 48(175): 203 - 208.
- [29] Ige OK. Comparative study of risk behaviour for non-communicable disease among the junior and senior staff of the university of Ibadan. Fellowship dissertation, WACP, 2010 October.
- [30] Shivaramakrishna HR, Wantamutte AS, Sangolli HN, Mallapur MD. Risk factors of coronary heart disease among bank employees of Belgaum City – cross – sectional study. *Al Ameen J Med Sc.*, 2010; 3(2): 152 – 159.
- [31] Adedoyin R, Mbada C, Balogun M, Martins T, Adebayo R, Akintomide A, et al. Prevalence and pattern of hypertension in a semiurban community in Nigeria. *Eur J Cardiovasc Prev Rehabil.*, 2008; 15: 683 - 687.
- [32] Mooney LA, Franks AM. Evaluation of community health screening participants' knowledge of cardiovascular risk factors. *J Am Pharm Assoc.*, 2009; 49: 529 - 537.
- [33] Oghagbon EK, Okesina AB, Biliaminu SA. Prevalence of hypertension and associated variables in paid workers in Ilorin, Nigeria. *Niger J Clin Pract.*, 2008; 11(4): 342 - 346.
- [34] Grima SA, Alegria EE, Jover EP. The prevalence of classic cardiovascular risk factors in a working Mediterranean population of 4996 men. *Rev Esp Cardiol.*, 1999; 52(11): 910 – 918.
- [35] Annamalai C, Govindaraja C, Chandrmoul C. Prevalence, awareness and control of hypertension among estate workers in Malaysia. *N Am J Med Sci.*, 2011; 3(12): 540 - 543.
- [36] Achidi EA, Tango DA. Risk assessment of cardiovascular disease among staff of university of Buea, South West Cameroon. *J Public Health Epidemiol.*, 2010; 2(9): 257 - 261.
- [37] Nwankwo EA, Ene AC, Biyaya B. Risk factors in volunteers for health check: A study of rural and urban residents in the Northeast Nigeria. *The Internet Journal of Cardiovascular Research*, 2008; 5(2): 46 - 50.