

**RELATIONSHIP OF PHYSICAL ACTIVITY AND GENDER TO INCIDENCE OF OVERWEIGHT AND OBESITY AMONG CIVIL SERVANTS IN SOUTH EASTERN NIGERIA**

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**ABSTRACT**

*The fundamental cause of obesity and overweight is an energy imbalance between calories consumed on one hand, and calories expended on the other hand. Global increases in overweight and obesity are attributable to a number of factors including: a trend towards decreased physical activity due to the increasingly nature of many forms of work such as the civil service routines. This cross-sectional study determined the relationship between physical activity and gender on the incidence of overweight and obesity among civil servants in Akwa Ibom State, South Eastern Nigeria. It involved 2042 participants, 1037 males and 1005 females. They were randomly selected from different ministries in Akwa Ibom State civil service secretariat headquarters, Uyo. Informed consent was granted by respondent while the medical research and ethics committee granted approval for the study. Exclusion criteria were: pregnancy, age >60yrs and physical deformity. For inclusion, one must be a civil servant, ages between 18 and 55yrs. Physical activity assessment questionnaire was administered. Body mass index was calculated using respondent's weight in kg divided by height in meters squared ( $W_{\text{kg}}/H_{\text{m}}^2$ ). Overall prevalence rate of obesity was 11.5%. Among the physically active males and females, it was 9.5 and 8.0% respectively. There was a significant association between physical activity and the prevalence of obesity in both sexes ( $P < 0.01$ ). Relationship between intensity of exercise and prevalence of obesity showed a significant association for both sexes ( $P < 0.01$ ). The odd ratio for obesity was high among the physically inactive civil servants. Result of this study demonstrated that physical inactivity is a strong driving force to the development of overweight and obesity. Increase physical activity should therefore be given a priority place in programmes of weight control and management.*

**Keywords: Physical Activity, Obesity, Civil Servant, Nigeria.**

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**INTRODUCTION**

The fundamental cause of obesity and overweight is an energy imbalance between calories consumed on one hand, and calories expended on the other hand. Global increases in overweight and obesity are attributable to a number of factors including: a trend towards decreased physical activity due to the increasingly nature of many forms of work such as the civil service routines. The recent global increase in prevalence of overweight and obesity calls for concern by all strata of our society. The present and future health implications and financial burden on the economy of all and sundry especially the civil servants should be taken seriously. Obesity, according to the World Health Organization (WHO), defined as body mass index (BMI)  $\geq 30\text{kg/m}^2$  while overweight is BMI of  $25.0\text{--}29.9\text{kg/m}^2$ , is increasing rapidly and steadily both in adults and children (WHO, 2001). It is faster in developing countries of the world including Nigeria (Popkin, 2002). Currently, there are about 1.7 billion overweight adults and at least 300 million of them are obese. Overweight affects more people than malnutrition and hunger (Flegal, et al, 2002). This rapid upsurge in obesity and its complications is fueled by a lot of factors such as physical inactivity (sedentary lifestyle), poor dietary habit, genetic, drugs, alcoholism and smoking habits. Physical inactivity has been of major concern. Worldwide, there has been a large shift towards less physical demanding work, and currently at least 60% of the world's population does not get enough exercise

## **Relationship of Physical Activity and Gender to Incidence of Overweight and Obesity among Civil Servants in South Eastern Nigeria**

(WHO, 2009). This is primarily due to increasing use of mechanized farming, transportation and greater prevalence of labour technology in the homes and offices (WHO, 2009) such as washing machines, remote controls, dishwashing machines and computers. Generally, the trend towards industrialization in developed and developing countries like Nigeria has improved the standard of living, and in the services available, thus increasing the sedentary life style and other less energy demanding activities mostly 00 recreational pursuits. Studies in children and adults have found an association between the number of hours of television watch and the prevalence of overweight and obesity (Vioque et al, 2000). A 2008 meta-analysis found that 63 of the 73 studies (86%) showed an increase rate of childhood obesity with increase media exposure; rates increased proportionally to the time spent watching television (Ezekiel J, 2008). This work therefore aim to assess the effect of a typical civil service routine on the weight and subsequently the health implication of workers since 90-95% of occupants of Uyo metropolis are civil servants.

### **METHOD**

This was a cross-sectional study conducted in various ministries in Akwa Ibom state civil service secretariat headquarters located in Uyo Metropolis. A total of 2042 civil servants participated in the study. 1005 (49.2%) were male while 1037 (50.8%) were female. They were selected by stratified random sampling. Approved consent was obtained from each respondent. The study protocol was approved by the University of Uyo medical research and ethnics committee, as well as the Head of civil service. Physical activity assessment questionnaire was administered to each respondent to complete and return. The questionnaire sorts to assess the activity status of each civil servant. Respondent were asked whether they do engage in any form of physical activity outside the civil service routine. Respondent who said yes were further assessed on the degree of the activity involved. To assess participants on moderate physical activity, they were asked if when not working, they do moderate activities for at least 10minutes at a time, such as brisk walking, bicycling, gardening or anything else that cause some increase in breathing or heart rate in a usual way. Respondent who answered 'yes' were asked how many days per week they, engaged in moderate activities and the amount of time spent in activities on each of those days. To assess participants on vigorous activities, respondent were asked to report whether they do vigorous activities for at least 10minutes at a time such as running, heavy yard work, jumping, foot balling, swimming or anything else that cause large increase in breathing or heart rate in a usual week when not working. Those who said "Yes" were asked how many days per week they engaged in vigorous activities and the amount of time spent in activities on each of those days. Respondents were then classified into three groups of mild, moderate and vigorous or severe exercise based on the 2010 US healthy people physical activity guideline/standard. This guideline recommends 150mins of moderate to severe intensity aerobic physical activity per week in bouts of 10mins or more for adults' ages between 18 and 64yrs. In this study, participants who engaged in 10-30mins, 1-2days/week of exercise were classified as engaging in mild activity. For 30-40, 3-4 days/week as moderate physical activity, while those who engaged in physical activity for  $\geq 1$ hour, 3-4 days/week were classified as severe exercise. The obesity status of participants was assessed using body mass index (BMI) as recommended by WHO. BMI is defined as the ratio of weight in kg divided by height in meters squared ( $BMI = \frac{W_{kg}}{H_{m}^2}$ ). The height and weight of each respondent were measured using the standard protocol given by Weiner and Lourie (Weinner et al, 1981). Based on this classification, participants with BMI of  $< 18.5$  were considered underweight, 25.0-29.9 as overweight and  $BMI \geq 30$  as obese.

### **STATISTICAL ANALYSIS**

Data were computed and descriptive statistics were generated using frequency and simple percentages. These were performed on all the socio-demographic variables of the subjects. These include: sex, marital status, age group, smoking habit and dietary habit. Furthermore, in order to investigate the significance of association between physical activity and obesity, a chi-square test ( $\chi^2$ ) of independence was employed. Statistical analysis was also intensified to test the relationship between intensity of exercise and prevalence of obesity. This analysis was also carried out using chi-square test. Further analysis was also performed using binary logistic regression model (both the univariate and multivariate binary logistic model were used). The univariate binary logistic regression model was used to test separate effect of physical activity on prevalence of obesity (model I) without

bringing in the confounding factors. The multivariate logistic regression model (model II) was used to take care of all the confounding factors such as; sex, marital status, age, smoking habit and dietary pattern. All analysis was facilitated using statistical package for social Sciences (SPSS) version 17.0.

**RESULT**

Data for 2042 subjects sampled showed that 49.3% were males while 50.8% were female. 46.3% of the sample were single and the remaining 53.7% were married. 70.5%, 13%, 7.8% and 8.8% were between ages 18-35yrs, 36-45yrs, 46-55yrs and 56 and above years respectively. Prevalence rate of obesity was 11.5%. See table 1. In addition, prevalence of overweight and obesity among the physically inactive males and females were 27.1%, 14.4% for males and 25.1% and 14.0% for female respectively. For physically active males and females, prevalence was 23.8% and 9.5% for males and 20.3% and 8% for females respectively (table 2). The result of chi-square test investigating association between physical activity and prevalence of obesity showed a significant association in both male and female subjects (P<0.01). These results are showed in table 2. Association between intensity of exercise and prevalence of obesity among study subjects showed a statistical significant association for both sexes (P<0.01). There was inverse relationship between the intensity of physical activity and prevalence of obesity among the physical active participants (table 3). Moreover, the results of both univariate and multivariate binary logistic regression showed a significant effect of physical activity on body mass index (P<0.05). After controlling for the confounding factors, the odd ratio of physical activity were significantly elevated (table 4).

**TABLE 1: socio demographic status of the subjects**

**TABLE 2: PHYSICAL ACTIVITY AND PREVALENCE OF OBESITY AMONG MALE AND**

	<b>UNDERWEIGHT</b>	<b>NORMAL WEIGHT</b>	<b>OVERWEIGHT</b>	<b>OBESE</b>
<b>SEX</b>				
Male (n=1005)	46 (4.6%)	586 (58.3%)	254 (25.3%)	119 (11.8%)
Female (n=1037)	69 (6.7%)	615 (59.3%)	236 (22.8%)	117 (11.3%)
<b>MARITAL STATUS</b>				
Single (n= 947)	66 (7.0%)	659 (69.6%)	169 (17.8%)	53 (5.6%)
Married (n=1095)	49 (4.5%)	542 (49.5%)	321 (29.3%)	183 (16.7%)
<b>AGE</b>				
18-35yrs (n=1439)	94 (6.5%)	994 (69.1%)	227 (19.2%)	74 (5.1%)
36-45yrs (n=264)	4 (1.5%)	69 (26.1%)	110 (41.7%)	81 (30.7%)
46-55yrs (n=159)	5 (3.1%)	30 (18.9%)	61 (38.4%)	63 (39.6%)
<b>SMOKING HABIT</b>				
Still smoking (n=329)	14 (4.3%)	129 (39.2%)	122 (37.1%)	64 (19.5%)
Never smoked (n=1030)	64 (6.2%)	773 (75.0%)	140 (13.6%)	53 (5.1%)
Stopped smoking (n=635)	35 (5.5%)	280 (44.1%)	212 (33.4%)	108 (17.0%)
<b>DIETARY HABIT</b>				
Poor dietary habit (n=1670)	96 (5.7%)	984 (58.9%)	383 (22.93%)	207 (12.4%)
Good dietary habit (234)	10 (4.3%)	128 (54.7%)	77 (32.9%)	19 (8.1%)
others (n=6)	0 (0%)	3 (50%)	0 (0%)	3 (50%)

**Relationship of Physical Activity and Gender to Incidence of Overweight and Obesity among Civil Servants in South Eastern Nigeria**

**FEMALE SUBJECTS**

PHYSICAL ACTIVITY	BODY MASS INDEX							
	MALE				FEMALE			
	UNDE R WEIG HT	NORMA L WEIGHT	OVER WEIGHT	OBESE	UNDER WEIGHT	NORMAL WEIGHT	OVE R WEI GHT	OBESE
<b>EXERCISE (n=1049)</b>	33 (6.1%)	325 (60.5%)	128 (23.8%)	51 (9.5%)	35 (6.8%)	332 (64.8%)	104 (20.4%)	41 (8.0%)
<b>NO EXERCISE (n=926)</b>	13 (3.0%)	242 (55.5%)	118 (27.1%)	63 (14.4%)	32 (6.5%)	266 (54.3%)	123 (25.1%)	69 (14.1%)

$X^2$  calculated (male) = 12.16, P-value = 0.007 (P<0.01), significant in male:  $X^2$  calculated (female) = 15.66, P-value = 0.001 (P<0.01), significant in female  
 Association of physical activity and prevalence of obesity was performed using chi-square test.

**TABLE 3: ASSOCIATION BETWEEN INTENSITY OF EXERCISE AND PREVALENCE OF OBESITY AMONG MALE AND FEMALE SUBJECTS WHO ENGAGED IN PHYSICAL ACTIVITIES.**

INTENSITY OF PHYSICAL ACTIVITIES	BODY MASS INDEX							
	MALE (n = 517)				FEMALE (n= 490)			
	UNDER WEIGHT	NORMAL WEIGHT	OVER WEIGHT	OBESE	UNDER WEIGHT	NORMAL WEIGHT	OVERW EIGHT	OBESE
<b>MILD (n = 469)</b>	12 (5.2%)	120 (51.7%)	69 (29.7%)	31 (13.4%)	19 (8.0%)	136 (57.4%)	54 (22.8%)	28 (11.8%)
<b>MODERATE (n=242)</b>	7 (4.7%)	97 (64.7%)	32 (21.3%)	14 (9.3%)	6 (6.5%)	61 (66.3%)	20 (21.7%)	5 (5.4%)
<b>SEVERE (n = 296)</b>	12 (8.9%)	93 (68.9%)	24 (17.8%)	6 (4.4%)	9 (5.6%)	119 (73.9%)	25 (15.5%)	8 (5.0%)

Males:  $X^2$ -Calc = 20.26, df= 6, P<0.05 (significant in males);  
 14.12, df= 6, P<0.05 (Significant in females).

Females:  $X^2$ -Calc =

**TABLE 4: ASSOCIATION BETWEEN OBESITY AND PHYSICAL ACTIVITY (ODD RATIO AND 95% C.I)**

PHYSICAL ACTIVITY	OBESITY (ODD RATIO 95% C.I)	
	MODEL I	MODEL II
NO EXERCISE	1.00	1.00
EXERCISE	0.58 (0.44-0.77)	0.66 (0.47-0.92)

MODEL I: No adjustment.

MODEL II: Adjustment for sex, marital status, age, smoking habit and dietary habit. P< 0.05 (significant).

## DISCUSSION

Increased physical activity and dietary control have occupied the central position in the management and prevention of overweight and obesity at work place. This is because yesterday's jobs have been replaced by sitting and sedentary activity, with the introduction of modern technology into the civil service, such as the use of lifters, computers, remote controls, mobile phones and internet facilities. Over the past 50yrs, work has shifted from a more energy consuming agriculture to more sedentary office job. Obesity has significantly increased from less than 10% in 1950s to more than 30% to day (Timothy S. et al, 2011). Long hours spent at work place can certainly lead to eating more package, high fat, high sugar convenience foods, and skipping daily exercise (Timothy s et al, 2011). In US, research have shown that, only approximately 20% of private industry jobs today require a moderate level of physical effort, compared to 50% fifty years ago. Also an average American employee today requires at least 100 fewer calories over the course of a typical work year (180 days) and pack about 4.4 pounds of excess weight (Timothy S et al, 2011). Physical activity and exercise help to burn calories. The amount of calories burned depends on the type, duration and intensity of the activity. According to the 2009 Gallup Health ways well-being index, the number of days per week and duration of exercise per days is strongly connected to the likelihood of obesity. Not exercising in a given week was associated with 35% incidence of obesity according to the survey. Also exercising for 30mins, 1-2days per week was associated with a 28% incidence of obesity. Again, the survey also showed that, exercising several days a week seem about as good as, and arguably, is better than exercising everyday. Thus, those who exercise everyday were slightly more likely to be obese (20%) than those who exercise 5-6 days (19%) (Bill et al, 2009). Also, a recent research findings by Dr Ruth loose in his work in UK demonstrated that physical activity help to combat obesity in a genetically predisposed individual. He reported that genetically predisposed individual on a sedentary job and engaging in zero recreational physical activity add an extra 1.3lb (0.59kg) per variant to their weight, a moderately inactive people who reported less than 30mins a day of recreational activity on top of a sedentary lifestyle-were comparatively less overweight, logging an extra 0.87lb (0.39kg) per variant. The strongly active person who exercise more than an hour a day outside their sedentary job will gain an extra 0.8lb (0.36kg) per variant, a full 36% less than their least active peers. Overall, by exercising, they had reduced their genetic risk of obesity by 40% compared with their inactive peers (Laura F, 2010). In Cochrane, Shaw KA and colleague in their 43 studies with 3475 participants found that exercise when combined with diet resulted in a greater weight reduction (WMD 1.0kg; 95% confidence interval (CI) -2.3 to -0.7). Increased exercise intensity increased the magnitude of weight loss (WMD-1.5kg; 95% CI -2.3 to -0.7). There were significant differences in other

## **Relationship of Physical Activity and Gender to Incidence of Overweight and Obesity among Civil Servants in South Eastern Nigeria**

outcome measures such as serum lipid, blood pressure, fasting plasma glucose. Higher intensity of exercise resulted into greater reduction in fasting serum glucose than lower intensity of exercise. The result of this review supports the use of exercise as weight loss intervention particularly when combined with dietary change. Exercise is associated with improved cardiovascular disease risk factors even if no weight is lost, according to the survey (Shaw et al, 2006). In Jamaica, a contrary result was obtained by researchers from Loyola and other centers. They found that, there was no association between weight gain and calories burned during physical activity. However, dietary intake, they said, may be more important than energy expenditure level; weight loss is not likely to happen without dietary restraint (Luke et al, 2009). Findings in our study have agreed with the result obtained in US and Cochran and also with result of Jamaica researchers. The overall incidence of obesity among civil servant was 11.5%. For the physically active males and females participants, the prevalence dropped to 9.5% and 8.0% respectively. The effect of the intensity of physical activity on incidence of obesity was very obvious from the result of this study. For the physically active males, who engaged in mild, moderate and severe exercise, the prevalence was 13.4%, 9.3% and 4.4% respectively. For female, prevalence was 11.8%, 5.4% and 5.0% for mild, moderate and severe exercise. These were significant at 99.9% ( $P_0 < 0.001$ ). Also, the odd ratio for obesity was very high for the physically inactive participants and was significant at 95% confidence interval. Again when combined with good dietary habit, the prevalence of obesity was maintained at 8.1% for physically active while those with poor dietary habit, the prevalence went up to 24.4%. Therefore, a good dietary practice is necessary for the sustenance of weight reduction achieved through physical activity according to the result of this study.

### **CONCLUSION**

From the findings in this study, there is therefore overwhelming evidence that physical inactivity is a strong driving force to the development of overweight and obesity. Also, that physical activity, when combined with dietary control, gives a better and faster result in the control and prevention of overweight and obesity.

### **RECOMMENDATION**

Since it is obvious that physical inactivity has become a public health burden, it should be integrated into our health care system. Doctors need to take an aggressive lead in fighting obesity, asking and measuring patient weight and recommending exercise- even if they think patients will ignore it. Also, policy and other decision makers should make informed decision that will encourage physical activity and by that reduce the burden of obesity in Nigeria.

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