MJSIR
Mountain Journal of Science and Interdisciplinary Research
PRINT ISSN: 2619-7855
ONLINE ISSN: 2651-7744
October-December 2019 • 79 (2 Suppl 1) : 117-127

Nutritional and Blood Pressure Profile and Its Correlates: The Case of Benguet State University Employees, Philippines

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Abstract

Experts have identified the increasing trend of overnutrition and are recommending the implementation of an appropriate nutrition action plan based on sound and extensive research data. In support of this, the study evaluated the nutritional status and blood pressure of employees in Benguet State University vis-a-vis their work performance ratings, as part of developing a nutritional plan for the agency. Body Mass Index (BMI), waist circumference (WC) and waist-hip ratio (WHR) were used as indicators of the nutritional status. A self-administered questionnaire was used to gather the socioeconomic profile of the 116 randomly selected employees. The majority were in their peak of productive years, females, non-teaching, college graduates, co-breadwinners, have served for >10 years, and are of outstanding work performance based on the University's performance evaluation instrument. The analysis revealed that half of the employees had normal body mass indices, the rest being overweight (42%), and obese (8%). Mean waist circumference and waist-hip ratio, however, did not indicate abdominal adiposity. Only one-fifth (20%) had blood pressure readings within the normal range despite the use of medications. Education, religion, and family income were correlated with BMI. Sex and household size were associated with WHR while sex and family income correlate with high blood pressure. Work performance rating, on the other hand, did not correlate significantly with the nutritional status of the employees. The study hopes that these data will help guide the crafting of a holistic wellness program of the University to avert overweight, obesity, and high blood pressure.

KEYWORDS

Body Mass Index
Waist Circumference
Blood Pressure
Work performance
University Employees

Introduction

Nutritional status results from the combination of what we eat, how the body utilizes nutrients, and our genes. Good nutrition is the foundation of good health (Eppright, 1963). On the other hand, malnutrition has been linked not only to increased incidence of illness or death but also to low productivity affecting the quality of life. Poor nutrition perpetuates the cycle of poverty and malnutrition through three main routes namely: [(1)]direct loss of productivity from poor physical status and losses caused by disease linked with malnutrition; [(2)]indirect losses from poor cognitive development; and, [(3)]losses caused by increased

health care costs. Extremes of nutrient intake (under- and overnutrition) are associated with a variety of negative health outcomes. Obesity among adults increase the risk of metabolic disorders including type 2 diabetes, coronary artery disease, hypertension, and endocrine disorders (Anderson et al., 2015). According to the Food and Nutrition Research Institute (2013), there is a decreasing trend in the prevalence of Chronic Energy Deficiency from 13.9% to 10.3% but an increasing trend in the prevalence of overweight and obesity from 16.6% in 1993 to 31.1% in 2013. Overweight and obesity have been linked to a host of factors. Chronic Energy Deficiency (CED) or undernutrition has long-lasting physiologic effects including increased susceptibility to fat accumulation in the central region of the body, lower fat oxidation, lower resting and postprandial energy expenditure, insulin resistance in adulthood, hypertension, dyslipidemia and reduced capacity for manual work (Martins, 2011). Improving nutrition contributes to productivity, economic development, and poverty reduction by improving physical work capacity, cognitive development, school performance, and health by reducing disease and mortality (World Bank, 2006). Thus, the importance of maintaining good nutrition cannot be overemphasized.

Proper nutrition has to be emphasized particularly during adulthood as this is the longest period in the human life cycle (Ruiz et al., 2010). In the Philippines, the prevalence of CED from 13.9% in 1993 among adults was reduced to 10.3% in 2015 but the prevalence of overweight and obesity steadily increased within the same time span such that it practically doubled from 16.6% to 31.1% (FNRI, 2015). Overweight and obesity have been linked to a host of factors such as age, sex, education, household size, and gross family income. Factors significantly associated with overweight/obesity among Filipino adults 20 years and above include age group, civil status, wealth quintile, and educational attainment (Duante et al., 2019).

With the increasing trend of overnutrition in the country, government institutions are being encouraged to develop and implement nutrition action plans (Baccay, 2018). However, any nutritional plan should be based on sound and extensive research data (Solon, 2006; Mozaffarian et al., 2018). It is within this context that we conducted this study. The study evaluated the nutritional status and blood pressure of Benguet State University (BSU) employees vis-a-vis their performance rating with the hope of developing a health and nutrition program to address existing malnutrition problems which might affect work performance.

There have been previous studies on nutritional status in the university including the works of Degay (2008) and Afifi et al. (2009). Both assessments revealed that a significant proportion of the employees suffered from either chronic energy deficiency (CED) or over nutrition. The need to carry out another assessment to monitor the progress and provide bases for the development of health and nutrition programs in the University, led to the conceptualization of this study. However, due to the limitation of facilities, the study only considered body mass index (BMI), waist circumference (WC), and waist-hip ratio (WHR). These remain as the most feasible ways of detecting and classifying overweight and obesity. Nonetheless, BMI, WC, and WHR were found to correlate well with objective measurements of body fat using MRI, CT scan, or densitometry (De la Paz, n.d).

It is hoped that this study would serve as an eye-opener for those who are not optimally nourished to exert effort to at least attain their normal body weight range if not their ideal weight. Results may likewise be viewed as bases in developing a health and nutrition program of the university including an annual physical check-up and nutritional assessment.

Methodology

The study employed a cross-sectional survey in which data were taken at one point in time i.e., June and July 2016. To obtain qualitative data, a survey questionnaire was designed and was either self-administered or accomplished through interview.

The master list of all the permanent employees of Benguet State University from the Human Resource Management Office (HRMO) served as the population for the study from which the sample frame was derived. To be included, an employee must be permanent, on active duty (i.e. not on leave) and signifies intent and willingness by signing the consent form. The sample size was determined using the Slovin's formula at 10%

margin of error and 95% level of confidence (Ellen, 2018). After deriving the sample size, stratified random sampling was performed for both teaching and non-teaching employees.

Data Collection

The respondents were requested to visit the University Health Services (UHS) where their anthropometric measurements and blood pressure were assessed. They were also asked to accomplish the survey questionnaire. The survey questionnaire determined primarily the demographic profile of the respondents. A calibrated beam balance scale (Detecto) was used to obtain weight and height. Protocols in obtaining the weight such as minimal clothing, empty pockets, and proper positioning were observed. Likewise, in measuring the height, the Frankfort position of the head, arms relaxed on the sides, feet together were ensured. In both measurements, reading at eye level was observed.

In some cases, the waist and hip measurements were taken in the employees' workplaces. A non-stretchable tape measure was used to measure the waist and hip circumferences. To measure the waist, the tape measure was put around the area of the narrowest diameter in the trunk area. If the narrowest area is not obvious, the tape measure was put midway between the lowest rib and tip of the hip bone. The hip circumference was measured as the distance around the largest area of the hips, usually the largest part of the buttocks or the greatest trochanter. The waist and hip circumferences were recorded to the nearest 0.1 cm and measured only once.

Blood pressure was measured in a single visit via seated resting BP determination using an aneroid gauge type sphygmomanometer and stethoscope following standard measurements. On the other hand, the work performance ratings of the respondents were requested from the Human Resource Management Office.

Data Analysis

The anthropometric data gathered served as bases for the computation of body mass index (BMI) and waist-hip ratio using the following formulas:

$$BMI = \frac{(Weight(kg))}{(Height\ (m^2))}$$

$$WHR = \frac{(Waist\ Circumference\ (cm))}{(Hip\ Circumference\ (cm))}$$

The Body Mass Index does not measure body fat directly but it correlated with more direct measures of body fat obtained from skinfold thickness measurements, densitometry, and other methods. Generally, it is an inexpensive and easy way to perform a method of screening for weight category (CDC, 2017). The computed BMI was interpreted using the World Health Organization (WHO) guidelines (Table 1). The same guidelines was used by the Food and Nutrition Research Institute (FNRI) in the National Nutrition Surveys (NNS) in the country.

On the other hand, the waist-hip ratio (WHR) and waist circumference (WC) imply body fat distribution particularly the accumulation of body fat in the abdominal area. Thus, high waist circumference and waist-hip ratio indicate abdominal obesity. These are also associated with metabolic diseases like diabetes mellitus and dyslipidemia (FNRI, 2015). Both are used also as indices of nutritional status among adults in national nutrition surveys. In clinical settings, the BMI is also a valuable guide in evaluating health risk. The waist circumference and waist-hip ratio were classified based on the WHO classification (Table 2). Lastly, the blood pressure readings were classified according to the Joint National Committee on detection and treatment of high blood pressure (JNC VII) as shown on Table 3.

Moreover, the work performance ratings obtained from the Human Resource Management Office (HRMO) were interpreted using the criteria being used in the university (Table 4). This information together with the demographic profile of the respondents were correlated with the nutritional status. These correlations could yield valuable information such as nutrition trends that could be used in crafting the university's health programs.

Frequencies, percentages, and measures of central tendencies were used to analyze and present the computed data particularly the profile, nutritional status, BP levels, and level of work performance. Appropriate statistical methods e.g. Pearson for BMI and work performance, were used to establish correlations.

Table 1

Classification of Nutritional Status Based on BMI (adopted from WHO)

Classification of Nutritional Status	BMI kg/m²
Chronic Energy Deficiency (CED)	<18.5
Normal	18.5 – 24.9
Overweight	25.0 – 29.9
Obese	>30.0

Table 2

Classification of Nutritional Status Based on Waist Circumference and Waist-Hip Ratio (WHO Classification)

	Waist Circumference (cm)	Classification Of Nutritional Status	Waist Hip Ratio
Males	≤90	Low	≤0.9
	90 to 101	Normal	0.9 to 0.99
	≥102	High	≥1.0
Females	≤80	Low	≤0.8
	80 to 87	Normal	0.8 to 0.84
	≥88	High	≥0.85

Table 3

Blood Pressure Classification

BP Classification	Systolic BP (mmHg)		Diastolic BP (mmHg)
Normal	≤ 120	and	≤80
Pre-Hypertension	120 – 139	or	80 – 89
Hypertension	≥ 140	or	≥90
Stage 1 Hypertension	140-159	or	90-99
Stage 2 Hypertension	≥160	or	≥100

Table 4

Ratings of Work Performance and their Interpretation

Numerical Rating	Interpretation
81 – 100%	Outstanding
61 - 80%	Very Satisfactory
41 – 60%	Satisfactory
21 – 40%	Fair
1 – 20%	Poor

Results and Discussion

Socio-demographic Characteristics of Respondents

The demographic profile of the employee respondents were presented in Table 5. The respondents were predominantly females which could be related to nutritional status. In a survey conducted by Gjonca and Calderwood (2004), women outnumber men because of their higher survival rate especially for ages above 50. The Philippine Statistics also reported in 2010 that there were more female senior citizens as compared to males at 55.8% and 44.2%, respectively.

The mean age of respondents was 45.6 years with the youngest at 20 years while oldest at 64 years. This data is related to the report of the Philippine Statistics Authority that unemployment is higher for younger males aged 15-24 at 48.2% compared to 30.9% for 15-34 years old males.

In terms of religious affiliation, majority were Roman Catholics. In 2010, the Catholics comprise 50% of all Christians worldwide and 16% of the world's total population (Toro, 2013). Citing the Pews Research Center, Toro reported that the Philippines ranked as the third country with the most number of Roman Catholics with 81% of its citizens reportedly belonging to the group. In terms of educational attainment, 49% of the respondents have masteral degree. A master's degree has been the minimum qualification standards of the Civil Service Commission for higher education teachers. The average household size was 4.5 members which are practically the same as the 4.6 national average reported by the Philippine Statistics Authority (2012).

Fifty-nine percent (59%) of the employees were co-breadwinners indicating that they have other family members who were earning. The estimated gross family income per month ranged from <Php 10,000 to >Php 50,000. Only 3% had family incomes below the poverty threshold of P8,022 for an average family size of 5 in the Philippines (PSA, 2012). The length of service of the respondents varied from one (1) to 43 years, the mean duration is 18 years. This implies that employees are satisfied with the working conditions of the University that have enabled them to stay and perform their roles well. This

also surpassed the fifteen-year requirement for Government Service Insurance System, which qualifies them for retirement benefits. Lastly, in terms of work performance rating as indicated by their rating in the Individual Performance and Commitment Review (IPCR), the lowest rating obtained was 4.2 (very satisfactory) while the highest was a perfect 5 (Outstanding). Nine in every 10 employees were rated as Outstanding. On the whole, the mean performance rating was 4.71 which is interpreted as Excellent or Outstanding. While the mean work performance of the teachers (4.75) was higher than the non-teaching counterparts (4.67), no significant difference was noted (p>0.05).

Nutritional status

The study used the Body Mass Index (BMI), waist circumference (WC) and the Waist Hip Ratio (WHR) to indicate the nutritional status of the respondents.

Body Mass Index. The body mass index is used to estimate the degree of obesity or amount of body fat. It is also being used in most clinical settings as this helps determine how much risk people have in developing health problems due to their weight (Dellova et al., 2006).

Based on the BMI, 50% of BSU employees were of normal nutritional status (Figure 1). The other half were either overweight (42%) or obese (8%). No employee suffered from chronic energy deficiency (CED). This result implied the presence of food security among the employees. However, the mean BMI (25.5) for all employees is interpreted as overweight. The mean was practically the same if the employees were grouped by nature of work (teachers–25.7, non-teaching–25.5), thus no significant difference (p=>0.05) was noted.

The percentage of employees with normal nutritional status at present is exactly the same as what was reported among non-teaching employees 10 years ago (Afifi et al., 2009). However, it is slightly lower than the 55% reported in 2008 by Degay. There is no case of chronic energy deficiency (CED) compared to a few isolated cases then. Combined overweight and obesity prevalence increased from 4 in every 10 employees to 5 out of 10 in this study. These data show a shift in the nutritional status– an increase in prevalence of overnutrition as manifested by high BMI.

Table 5

Socio-demographic Characteristics of the Employees (n=116)

Characteristics	Frequency	%
Male	44	38
Female	72	62
Age in years as of last birthday (mean = 45.6 y)		
21-30	12	10
31-40	32	28
41-50	29	25
51-60	29	25
61 or older	14	12
Religion		
Roman Catholic	51	44
Protestant	32	28
Others	33	28
Education		
High School Level/Graduate	11	10
Vocational Graduate	3	2
College Level/Graduate	28	24
Masteral Level/Graduate	57	49
Doctorate	17	15
Household size (mean = 4.53 members)		
1-2 members	17	15
3-4 members	44	38
5-6 members	38	32
7 or more members	17	15
Sole breadwinner	47	41
Estimated Monthly Gross Family Income		
Less than Php 10,000	4	3
Php 10,000-20,000	29	25
Php 20,001-30,000	40	34
Php 30,001-40,000	7	6
Php 40,001-50,000	14	12
More than Php 50,000	22	19
Teaching Employees	57	49
Years in Service at the BSU (mean= 18 years)		
Less than 5 years	12	10
6-10	26	22
11-15	18	16
16-20	18	16
More than 20	42	36
Performance Rating (January-June 2016)		
Outstanding	100	86
Very Satisfactory	16	14

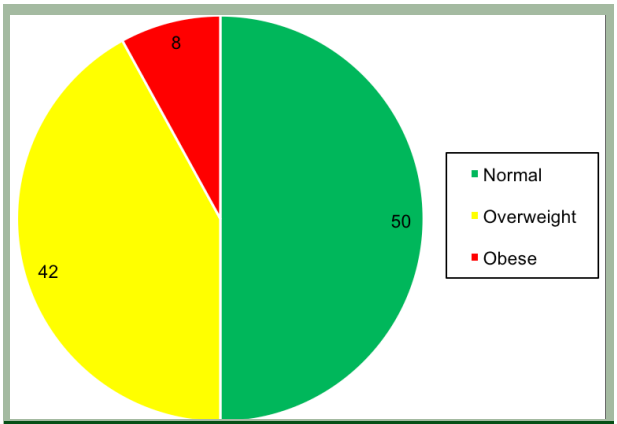

Figure 1. Distribution of Employees by Nutritional Status Based on BMI

The prevalence of overweight (42%) among the employees is almost twice the national percentage of 24.2% (FNRI-DOST, 2016). It is also higher than the regional prevalence of 27.6%. It is just slightly higher than the percentage of overweight in the province of Benguet (36.2%) which registered the highest percentage of overweight among the CAR provinces.

Obesity is also higher among BSU employees compared to the national data for all Filipino adults (6.9%), almost the same with adults in the CAR (7.8%) and lower than adults in Benguet (10.9%) as of 2015 survey by the FNRI. Region-wide, Benguet including Baguio City had the highest percentage of obesity. Obesity puts an individual at higher risk for a number of metabolic disorders including type 2 diabetes, coronary artery disease, hypertension, and endocrine disorders (Anderson et al., 2015).

Overweight and obesity increase the risk of having cardiovascular diseases, type 2 diabetes, various forms of cancer, and musculoskeletal disorders like arthritis and gout (NNC, 2015). It also poses risk to hypertension, dyslipidemia, and sleep apnea, breathing problems, and liver and gallbladder diseases. Hypertension, type 2 diabetes, and the metabolic syndrome are among the most commonly reported complications of adult obesity (Galicia et al., 2011). Obesity strains the heart which must work harder to nourish the unnecessary fat cells (Bellosillo, n.d.). Excess body weight, as what happens in obesity, is among the causal factors identified in high blood pressure or hypertension, the others being excess dietary sodium, inadequate intake of fruits/ vegetables, sedentary lifestyle, and excess alcohol (NDAP, n.d.).

Waist Circumference. The waist circumferences (WC) of male employees ranged from 73cm to 104cm with mean at 88.7cm. On the other hand, female employees had waist circumferences measuring 83 cm to 116 cm with a mean of 82.3cm. The mean WC implied absence of abdominal adiposity although the results were higher than the waist circumferences for Filipino adults reported by the FNRI-DOST in 2015 at 79.3 cm for females and 80.4 cm for males.

Waist-Hip ratio. The mean waist-hip ratio (WHR) among males and female employees were 0.92 and 0.86, respectively. Such figures are suggestive of the absence of abdominal adiposity and are comparable to the 2015 national data of 0.90 and 0.87 for males and females, respectively (FNRI, 2015). In terms of nature of work, i.e., teaching or not, the mean WHR (0.88 and 0.87) were similar ($p>0.05$). As a group, one in every four employees, however, had excess body fat around the abdominal area (Figure 2).

The waist circumference and waist-hip ratio indicate presence of excess body fat. Such fat is commonly found in the abdominal area among men thus described as central body fat or apple-shaped obesity. Among women, excess fat is more common in the gluteal area and this is otherwise termed as android or pear-shaped obesity. Excess body fat has been linked to chronic degenerative disorders like hypertension, cardiovascular diseases and the likes.

Blood Pressure. Only one out of five employees had normal blood pressure readings at the time of the study. This is despite the fact that 15% of the

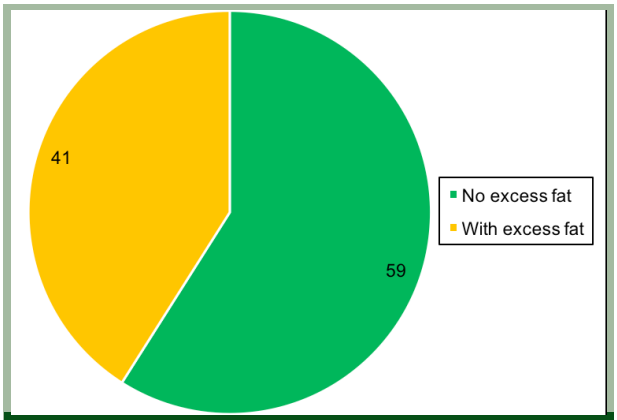

Figure 2. Distribution of Employees by According to Waist -Hip Ratio

employees (4 teachers and 13 non-teaching staff) are already taking anti-hypertensive medications. Their medications consequently resulted to lower blood pressure readings at the time of the study. One out of six respondents were in the pre-hypertensive stage based on their blood pressure readings of 120-139 over 80-89 mmHg. Almost one-fifth suffered from hypertension either stage 1 or 2. Three employees verbalized that they knew they were hypertensive but were not taking any medications to control their blood pressure.

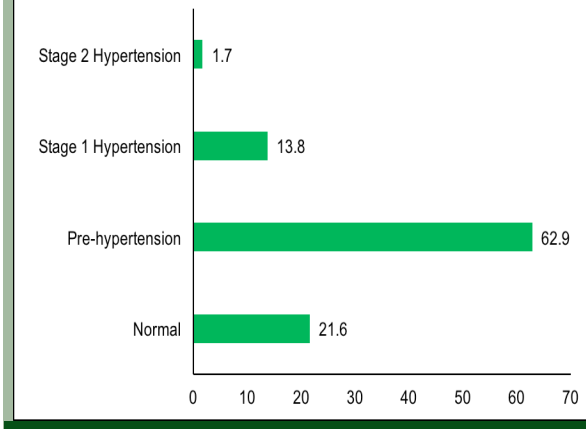

Figure 3. Distribution of employees according to blood pressure, mmHg

Further analysis showed a mean systolic and diastolic blood pressure of 118 mmHg over 79 mmHg respectively among the teaching personnel. Among the non-teaching employees, the mean systolic reading was 120mmHg and the mean diastolic blood pressure was pegged at 82mmHg. While the readings were numerically higher among the non-teaching group, T-test revealed no significant differences in both systolic and diastolic blood pressure reading between the two groups of employees (p=>0.05). Thus, regardless of the nature of work, the systolic and diastolic blood pressure were more or less the same.

Compared with the latest national and regional (CAR) prevalence of 22.3% and 26.7% (FNRI-DOST, 2016) for hypertension which combines stages 1 and 2, the prevalence of hypertension among BSU employees is much lower. Nonetheless, with a much higher prevalence of overweight and obesity, a rapid increase in hypertensive individuals may soon be a reality. At the national level, officials of the government had the second highest prevalence (28.4%) of hypertension. There were more males who were hypertensive, more in urban areas and more among the rich as the prevalence increased with increments in income. This is further strengthened by a meta-analysis study done by Gasperin et al. (2009) who stated that individuals who have stronger responses to stressor tasks were 21% more likely to develop BP increase when compared to less strong responses. Moreover, the Cordillera Administrative Region topped all 17 regions in the country in terms of hypertension prevalence rate. The blood pressure is one important vital sign. It is the pressure exerted by the blood upon the walls of the blood vessels which can be affected by factors such as the muscular efficiency of the heart, the blood volume and viscosity, the age and health of the individual, the state of the vascular wall and the nutritional state of an individual.

Correlation of Health and Nutritional Status

Results of correlation analysis found BMI to be associated with religion, education, gross family income, and blood pressure (Table 6). Religious affiliation influences food choices. Some religions restrict the consumption of meats and scaled fish, pork, and teas among others which in the long run may also affect total calorie intake. In the realm of health and nutrition, Claudio and Ruiz (2004) suggested that education can influence nutrition. The increased education facilitates learning about the causation, prevention, recognition, and cure of disease, as well as nutritional requirements that can subsequently affect health behavior as well as food intake. Moreover, Eppright et al. (1963) added that education is the cornerstone of good nutrition indicating the ability to comprehend whatever is read or heard and therefore having an effect on food choices. Also, having a regular income as in the salaries of the employees' impact on food security which would significantly influence quality and amount of food intake.

On the other hand, correlates of WHR were sex and household size. The differences in body build, size and composition between males and females are well-recognized such that the cut-off rates in waist circumference and WHR differ between the sexes. Family size influences the state of nutrition. A larger family size can be prone to undernutrition but this can be offset by family

Table 6

Factors Correlated to Health and Nutritional Status

Variables	BMI	p-values WHR	Blood Pressure
Nature of work	0.416	0.096	0.747
Age	0.141	0.335	0.543
Sex	0.644	0.000*	0.029*
Religion	0.005*	0.870	0.121
Education	0.035*	0.124	0.616
Length of Service	0.236	0.351	0.466
Workplace in the University	0.258	0.216	0.177
Household Size	0.128	0.035*	0.307
Economic Role	0.239	0.327	0.873
Gross Monthly Family Income	0.027*	0.886	0.004*
Health Status	0.602	0.906	0.193
Level of Work Performance	0.968	0.048	0.119
Blood Pressure Classification	0.000*	0.907	
Systolic Blood Pressure	0.058		
Diastolic Blood Pressure	0.000*		

**p=<0.05*

income. BSU employees have an average family size and with stable source of income, most of whom are above the poverty line. The prevailing overnutrition may be a result of excessive food intake with everyone being food secured.

Only the diastolic blood pressure was found to be associated ($p<0.05$) with body mass index at 95% level of confidence. This is the pressure exerted when the heart is at rest. Taking both systolic and diastolic pressure as one, a positive association with BMI was observed. Such finding corroborates the results of quite a number of published studies. Among adults in the United States, the prevalence of high blood pressure and mean levels of systolic and diastolic blood pressure increased as BMI increased at ages younger than 60 years (Brown et al., 2000). BMI was positively correlated with both systolic and diastolic blood pressure across three populations, namely, Ethiopia, Vietnam, and Indonesia (Tesfaye et al., 2007) and among tribal males of Northeast India (Mungreiphy et al., 2011). The same nature of association was also reported in earlier studies such as the INTERSALT study among men and women in almost all 51 centers around the world (Dyer & Elliot, 1989). These would point to the conclusion that people with increased BMI are at an increased risk for hypertension (Drevvoid et al., 2005).

The results, however, negate what Noble (2001) reported among obese adults where BMI was neither correlated with diastolic nor systolic blood pressure. Such study concluded that the waist-hip ratio foretells more regarding cardiac status as it correlated with all atherogenic indices (blood pressure, cholesterol, and triglycerides) in contrast to BMI. This study, however, did not attempt to correlate WHR to blood pressure.

Seventy-four (74%) of those with normal BMI had blood pressure classified as pre-hypertensive (Table 7). The trend is the same with those who are overweight. Among those who were overweight and obese, the prevalence of hypertension was much greater. The lack of significant difference in the number of employees with normal blood pressure regardless of BMI may be attributed to the fact that many

employees were under medication for hypertension already.

Exactly half of those with very satisfactory and with performance ratings were of normal BMI (Table 8). However, no significant correlation was found between the body mass index and the work performance (p=>0.05). The data indicate that regardless of the BMI, work performance was very satisfactory to outstanding.

The results somehow corroborate a population-based survey among Canadians which concluded that obesity is an independent risk factor for reduced work productivity. Being overweight was marginally associated with absenteeism and presenteeism while underweight was inversely associated with work productivity (Bustillos et al., 2015). In an earlier study by Siobhan and Fullen (2014) among habitual computer users, BMI was not associated with absenteeism, presenteeism and critical incidents. It should be noted that both researches had entirely different set of indicators compared to the bases of work performance as used in the university. Further research need to be done on this aspect as it may also be possible that the instrument for work performance was not able to measure actual work performance.

Conclusions

Overnutrition particularly overweight and obesity was observed among half of the employees. This is based on their body mass indices and waist-hip ratios. The high prevalence is alarming considering the detrimental effects of overweight or obesity being risk factors to several chronic degenerative diseases. With BMI being associated with blood pressure and only a few employees having normal blood pressure despite the use of anti-hypertensive medications the risk of cardiovascular-related diseases is also high.

Table 7

Distribution of Respondents by Blood Pressure and Body Mass Index

Blood Pressure Classification	BMI Classification						Total	
	Normal		Overweight		Obese			
	F	%	F	%	F	%	F	%
Normal	11	19	12	24	2	22	25	21.6
Pre-Hypertension	43	74	27	55	3	33	73	62.9
Stage 1 Hypertension	3	5	10	20	3	33	16	13.8
Hypertension	1	2	-	-	1	11	2	1.7
Total	57	100	49	99	9	99	116	100

p = <0.05

Table 8

Distribution of Respondents by BMI and Work Performance Rating

Body Mass Index	Performance Rating					
	Very Satisfactory		Outstanding		Total	
	F	%	F	%		
Normal	8	50	50	50	58	50
Overweight	7	44	42	42	49	42
Obese	1	6	8	8	8	8
Total	16	100	100	100	116	100

p = <0.05

Recommendations

The formulation and implementation of a holistic employee wellness program to include nutrition education is needed to deter increased prevalence of overweight and obesity. The conduct of a regular, at least annual health assessment to include nutritional indicators warrants serious consideration.

Acknowledgment

The researchers are indebted to the BSU officials, UHS, ISRD and research staff and employee-participants for their wholehearted support to this study. The Department of Human Nutrition, College of Home Economics and Technology, Benguet State University is also appreciated for handling the statistician's fee.

References

Afifi, N., Alos, J., Ayawan, M., Bangkilas, J., Bugalin, E., & Degay, I. (2010). Nutritional Status of the Non-Teaching Employees of the Benguet State University. *BSU College of Home Economics and Technology Research Journal* 6:34-44.

Anderson, J.B., Root, M.M., & Garner, S.C. (2015). Human Nutrition: Healthy Options for Life. MA: Jones & Bartlett Learning.

Baccay, O.T. (2018). DILG to LGU: Implement nutrition action plan. Philippine Information Agency. Retrieved from https://pia.gov.ph/news/articles/1009201

Bellosillo, A.B. (n.d.). Facts and Information on Coronary Heart Disease and Fibre. Makati City: FLEHD.

Brown, C.B., Higgins, M., Donato, K.A., Rohde, F.C., Garrison, R., Obarzanek, E., Erst, N., & Horan, M. (2000). Body mass index and the prevalence of hypertension and dyslipidemia. Obesity Research. 8(9): 605-19.

Bustillos, A.S., Vargas, K.G. III, & Cuadra, R.G. (2015). *Journal of Epidemiology and Global Health,* 5:191-199.

Center for Disease Control and Prevention (CDC). (n.d.). Healthy Weight: About Adult BMI. Retrieved at www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/ on April 24, 2017.

Claudio, V., & Ruiz, A. (2010). Nutrition Education: Principles, Approaches and Strategies. Merriam and Webster Bookstore, Inc. Metro, Manila, Philippines.

Degay, I.O. (2008). Nutritional Status of Benguet State University Employees and Students. BSU *College of Home Economics and Technology Research Journal*, 5:22-39

De la Paz, C.R. (n.d). Screening for Overweight and Obesity in Adults. In: State of the Art of Obesity Research in the Philippines, 1998-2011. Pasay City.

Dellova, C.V., Roxas, M.G.R., Velasco, Z.F., & Pataunia, Ma.C.A. et (2006). ABC's of Nutrition and Diet Therapy. Mutya Publishing Home. Metro Manila, Philippines. Retrieved from http://mutyapublishing.com.ph/?product=abcs-of-nutrition-and-diet-therapy-for-nursing-students-and-healthcare-practitioners

Drevvoid, W.B., Midtheill, K., Nilsen, T.I., & Holmen, J. (2005). Change in body mass index and its impact on blood pressure: a prospective population study. *Int J Obes*. 29(6): 650-5.

Dyer, A.R., & Elliott, P. (1989). The INTERSALT study: relations of body mass index to blood pressure. *Journal of Human Hypertension* 3(5): 299-308.

Ellen, S. (2018). Slovin's Formula Sampling Techniques. Retrieved at https://sciencing.com/slovins-formula-sampling-techniques-5475547.html

Eppright, E. (1963). Teaching Nutrition. 2nd Ed. Iowa State Press, Ames, Iowa

FNRI-DOST. (2015). 8th National Nutrition Survey. Taguig City: FNRI

FNRI-DOST. (2016). 2015 Updating of the Nutritional Status of Filipino Childrenand Other

Population Groups. Handbook focus on the Cordillera Autonomous Region distributed during the Regional Dissemination Forum on September 8, 2016 at Eurotel, Baguio City

Galicia, M.V.H., Arkoncel, M.L.C., & Pacheco, E.P., (2018). Complications of Adult Obesity. In: State of the Art of Obesity Research in the Philippines, 1998-2011. Pasay City

Gasperin, D., Gopal, N., Dias-da-Costal, Juvenal Soares, J.S., & Pattussi, M.P. (2009). Effect of Psychological Stress on BP Increase: A Meta-Analysis of Cohort Studies. Available at www.scielo.br/pdf/csp/v25N4/02.pdf.

Gjonca, E. & Calderwood, L. (2004). Socio-Demographic Characteristics. Institute for Fiscal Studies. Accessed on April 24, 2017

Martins, V.J.B., Toledo-Florêncio, T.M., Grillo, L.P., Franco, M.C.P., Martins, P.A., Clemente, A.P.G., Santos, C.D.L., Vieira, M.F.A., & Sawaya, A.L. (2011). Long-lasting effects of undernutrition. *Int J Environ Res Public Health,* 8(6):1817–1846. doi: 10.3390/ijerph8061817.

Mozaffarian, D., Angell, S.Y., Lang, T., & Rivera, J.A. (2018). Roles of government policy in nutrition-barriers to and opportunities for healthier eating. *BMJ*, 361:k2426.

Mungreiphy, N.K., Kapoor, S., & Sinha, R. (2011). Association between BMI, Blood pressure and age: study among Tangkul Naga Tribal Males of Northeast India. *Journal of Anthropology*.

National Nutrition Council. Nutrition Month Talking Points. (2015). Makati City

NDAP. (n.d.). Hypertension. Available at http://www.ndap.org.ph/hypertension-0. Accessed on February 7, 2016

Noble, R.E. (2001). Waist-to-hip ratio versus BMI as predictors of cardiac risk in obese adult women. *Western Journal of Medicine,* 174 (4): 240-241

Philippine Statistic Authority. (2012). Family and Income Expenditures Survey. Retrieved at www.psa.gov.ph/statistics

Philippine Statistic Authority. (2012). The Age and Sex Structure of the Philippine Population: Facts from the 2010 Census. Retrieved at https://psa.gov.ph/content/age-and-sex-structure-philippine-population-facts-2010-census. Accessed on April 24, 2017

Siobhan, F., & Fullen, B.M. (2014). Work performance: The impact of body mass index, physical activity and cardiorespiratory fitness levels in computer users with neck pain. *Physiotherapy Practice and Research* 35 (2): 67-74

Solon, F.S. (2006). Good governance for nutrition in the Philippines: Elements, experiences and l essons learned. *Food and Nutrition Bulletin,* 27(4): 343-352.

Tesfaye, F., Nawi, N.G., Minh, H.V., Byass, P., Bonita, R., & Wall, S. (2007). Association between body mass index and blood pressure across three populations in Africa and Asia. *Journal of Human Hypertension,* 21: 28-37.

Toro, R. (2013). The World's Catholic Population: (Infographic). Retrieved at https://www.livescience.com/27244-the-world-s-catholic-population-infographic.html

World Bank. (2006). Repositioning Nutrition as Central to Development a Strategy for Large-Scale Action. http://siteresources.worldbank.org/NUTRITION/Resources/281846-1131636806329/NutritionStrategy.pdf