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ORIGINAL ARTICLE

Comparing university students with different health education achievements in terms of body mass index

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Abstract

Health Education programme provides needed preparation of students which should build their personal competence towards avoidance of body mass index (BMI) problems. Therefore, the study compared university students with different health education achievements by mean BMI and determined if the achievements, gender, age range, and class level have significant interactions on mean BMI of the students. Descriptive survey was used and from 222, a sample of 87 health education students were purposively selected in the Department of Health Safety and Environmental Education, University of Benin. A 'BMI Scale', a Xiaomi Mi Smart Scale 2 (Model: XMTZC04HM), a standardized measuring tape and the 2022/2023 Senate Approved 100, 200, 300 and 400 Levels Health Education Programme Results were used to collect data. Data were analysed with descriptive and inferential statistics. Results showed that the BMI of university students with different health education achievements is possible normal weight with majority of the participants (54.0%), with the possible normal weight having a GPA of 2.40 – 3.49 while the least number of them (4.6%), had a GPA of 4.50 – 5.00. However, different health education achievements, gender, age range and class level had no interactions on mean BMI of the students at 0.05 level of significance. Therefore, health education students should be encouraged by their lecturers to continuously apply knowledge of health education into healthy behaviours appropriate to maintain possible normal weight.

Keywords: students · health · education · achievements · GPA · BMI

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Introduction

Body mass index (BMI), an indicator presumably the results of university students' genetic, health status, environmental and/or lifestyle events. From environmental and/or lifestyle perspective(s), the consumption of fatty and sugar-dense snacks and foods by students seems to be on the high side sometimes occasioned by the proliferation of fast-food centres within and outside university campuses. The visitation to such centres and consumption of the foods were seen among undergraduates especially as they begin educational pursuit (Ozbahar Acar, 2015). In addition, sedentary lifestyle as a result of prolong use of handsets, laptops or computers could result in accumulation of fats in the body and hence overweight or obesity, as some poor BMI.

Health risks associated with poor BMI are prevalent in weight issues. Poor BMI especially with those with value more than 35kg/m2 have greater chance of having type II diabetes than those with 23kg/m2 (Khanna, Peltzer, Kahar & Parmar, 2022). Among undergraduates of Lagos State University, for example, 10.4% males and 5.5% were overweight and 5.2% males and 5.5% females were obese; overall 34% females showed overweight/obesity for waist-to-hip ratio (Arisa, Anaemene & Mekwunye, 2020).

Though evidence has noted that majority Nigerian university students have normal BMI among the 16 to 22 years old representing 63.9% (Ajayi, Kadiri & Ugbenyen, 2022) and 62.86% among the Health Education students in Aminu Saleh College of Education (Azare, 2019), there is still considerably 30% left open to underweight, overweight and obese students. A number of factors could contribute to underweight of university students with ill-health and inadequate eating habits including poor meals and breakfast skipping as possible factors. Arisa, Anaemene and Mekwunye (2020) indicated that undergraduates showed poor eating (15%) and skipped breakfast (75.3%). Such unhealthful eating patterns sometime vary by individual biodata.

An assessment of BMI by gender, age range and Grade Point Average (GPA) exist. According to Alhazmi, Aziz and Hawash (2021), 53.6% female had normal BMI and academic achievement was negatively related to BMI with 79.9% having high GPA with a mean of 4.28. According to Azare (2019), significant difference was recorded with more females having higher BMI of mean value 25.35 than male Health Education students (mean 22.39). Azare added that a significant difference in BMI was also documented for age groups 20-30 and 31-40 of the health education students. Awareness of BMI likely results in healthful practices.

Being aware of personal health and health risk practices has effects on BMI. The higher the educational achievement of adults, the better health as against those with lesser educational attainment (Raghupathi & Raghupathi, 2020). Healthful practices are important and are partly the most predictive receptions determining a student's learning outcome (Heidari, Borjian, Ghodusi & Shirvani, 2017). University students with higher academic achievements are likely agents of normal BMI promotion.

In Health Education programme, the promotion of health, and prevention of disease are university students' responsibility for their health and immediate community. The academic, professional and social preparation of the students build them for personal competence toward avoidance of weight problem and the attainment of normal BMI. Based on the crucial place of Health Education in normal BMI attainment, a number of international and national efforts are on ground to sustain this tempo. The 'Healthy Lifestyles Programme (HeLP)' (Lloyd & Wyatt, 2015), an obesity avoidance programme is one such effort.

The effort is worthwhile but insufficient to put weight challenge under effective control without the efforts of university students themselves. This means that university students are required to translate knowledge acquired from exposure to Health Education Programme into action by controlling their nutritional habits, physical activity and stress exposure. In addition, several authorities have recommended interventions focusing on Health Education which promotes healthy eating habits, enhanced behavioural skills and physical activity (Bello, Esan, Fadare & Ikpeazu, 2023). Yet, in the University of Ibadan underweight, overweight and obesity was 10.5%, 18.7% and 7.2% respectively and with females indicating higher values in underweight, (11.7%), overweight (20.2%) and obesity (10.4%) (Oluwasanu et al. 2023). Hence, the study was determined to compare university students' Health Education achievements in terms of BMI and whether there were significant interaction and main effects of the different achievements, gender, age range, and class level on mean BMI of the students.

Method

The researcher used the descriptive survey to collect data from 222 Full Time Health Education undergraduates in the Department of Health, Safety and Environmental Education, University of Benin during the 2022/2023 Academic Session. A sample of 87 students (made up of 67 females and 20 males as well as 41, 18, 11 and 17 students who were < 16 years, 16 – 20 years, 21 – 25 years and > 25 years respectively) were purposively selected from the population based on certain inclusion criteria. For the inclusion, students that were successful in all Health Education examinations during the 2022/2023 Academic Session. The research was given approval before commencement by Health Research Ethical Committee (HREC) of the University of Benin Teaching Hospital and the Protocol Code is Adm/e 22/a/vol. vii/483117126. Each participant voluntarily gave a written Informed Consent before participation in the study. The information in the form was to elicit the consent of the students to have their Health Education results computed for a Grade Point Average (GPA), and have their height and weight measured.

Four instruments were used for data collection. First, a 'BMI Scale' consisting of weight, height, BMI (kg/m^2) and biodata (age range, gender and class level) of the students. Second, a Xiaomi Mi Smart Scale 2 (Model: XMTZC04HM), digital weighing scale standardized to measure weight in Kg and manufactured by Anhui Huami Information Technology Co., Ltd. (2019). Third, a standardized measuring tape calibrated in both inches and centimeters. The centimeter was used and converted into meter (M) by dividing with 100cm to obtain the height of the students. Fourth, the 2022/2023 Senate Approved 100, 200, 300 and 400 Levels Health Education Programme Results was used to compute the Health Education achievements of the students. The Health Education achievements culminated into GPA and this was obtained for each student using the number of credits attached to each course. For example, an 'A' grade in a 2 units course is weighted '10'. The sum of the weights was used to divide the highest obtainable score in order to get the GPA of each student. The GPA ranges included 1.50 – 2.39, 2.40 – 3.49, 3.50 – 4.49 and 4.50 – 5.00 meaning 'poor', 'good', 'very good' and 'excellent' respectively. Students were required to fill the BMI scale after their height and weight have been measured.

The procedure for calculating BMI was fully in accordance with the standards for anthropometric measurements, specifically the assessments of body height (expressed in cm) and body weight (expressed in kg), based on which BMI was calculated for each participant. Data collected were analysed using descriptive statistics and two-way ANOVA in an IBM SPSS version 21 set at 0.05 level of significance. Acceptable benchmark for taking decisions for mean BMI was based on the BMI ranges of < 16.5kg/m2, < 18.5kg/m2, ≥ (18.5 to 24.9) kg/m2, ≥ (25 to 29.9) kg/m2, ≥ 30kg/m2 qualifying an individual as severely underweight, underweight, normal weight, overweight and obesity (Weir & Arif, 2023). Since the foregoing BMI classifications are not the sole means of checking the fat composition of an individual, the researcher modified the classifications with the term, 'possible'. In addition, the number of participants for each of the intervening variable (gender, age range and class level) may be insufficient and its unequal representation in the two-way Analysis of Variance (ANOVA) also informed the use of the term, 'possible'.

Results

Data in Table 1 is the BMI of university students with different health education achievements. Mean scores of 22.63, 24.84, 24.69 and 20.00 were obtained for the 1.50-2.39, 2.40-3.49, 3.50-4.49 and 4.50-5.00 GPA respectively. A total BMI mean of 24.18 was obtained. With the total mean, the BMI of university students with 1.50-2.39, 2.40-3.49, 3.50-4.49 and 4.50-5.00 GPA was possible normal weight. Majority of the participants (54.0%), with the possible normal weight had a GPA of 2.40 – 3.49 while the least (4.6%) had a GPA of 4.50 – 5.00.

Table 1. Descriptive statistics of the BMI of university students with different health education achievements

Variable	Different health education achievements					Remark
	1.50 – 2.39	2.40 – 3.49	3.50 – 4.49	4.50 – 5.00	Total	
	n(%) 16(18.4)	n(%) 47(54.0)	n(%) 20(23.0)	n(%) 4(4.6)	n(%) 87(100)	
	M±SD	M±SD	M±SD	M±SD	M±SD	
Height (m)	1.62±.10	1.62±.17	1.59±.11	1.63±.08	1.61±.14	
Weight (kg)	58.88±6.59	61.46±12.46	61.75±11.31	52.50±6.61	60.64±11.17	
BMI (kg/m^2)	22.63±4.00	24.84±6.62	24.69±4.75	20.00±3.04	24.18±5.76	Normal

Data in Table 2 is gender and different health education achievements based on mean BMI of university students. The mean of female students with GPA of 1.50-2.39, 2.40-3.49 and 4.50-5.00 GPA were 23.46, 24.73 and 18.50 respectively representing possible normal weight. However, female students that achieved 3.50-4.49 GPA had a mean of 25.18 representing possible overweight. For the male students with GPA of 1.50-2.39, 3.50-4.49 and 4.50-5.00, mean of 19.05, 20.27 and 21.40 respectively representing possible normal weight were obtained. Conversely, for males with a GPA of 2.40-3.49, a mean of 25.14 representing possible overweight was also obtained. The grand mean of the influence of gender and different health education achievements on mean BMI of university students is 24.18 representing possible normal weight. Though, the overall BMI of female and male students across all GPA was possible normal weight, females and males with a GPA of 3.50-4.49 and 2.40-3.49 respectively were possibly overweight.

Table 2. Gender and different health education achievements based on mean BMI of university students

Category	Male (N = 20)	Female (N = 67)			
	Mean±SD	Mean±SD		F	p
1.5-2.39	19.05±3.20	23.31±3.61	Gender	0.528	0.469
2.4-3.49	25.14±6.86	24.29±6.18	Different health education achievements	1.801	0.154
3.5-4.49	20.27±1.75	25.18±4.74	Gender*different health education achievements	0.900	0.445
4.5-5.00	21.40±2.87	18.50±3.34			

Also, data in Table 2 shows the interaction and main effects of gender and different health education achievements on mean BMI of university students. The interaction effect was not statistically significant [F (3,79) = 0.900, p > 0.445]. No significant main effect was also recorded for gender [F (1) = 0.528, p > 0.469] and health education achievements [F (3) = 1.801, p > 0.154].

Data in Table 3 is the age range and different health education achievements on mean BMI of university students. Students with GPA of 1.50-2.39 who were 16-20 years, 21-25 years and > 25 years have mean of 22.56, 20.54 and 21.90 respectively, representing possible normal weight. However, the < 16 years old students with a GPA of 1.50-2.39 have a mean of 32,41, indicating possible obesity. The total mean across the four age ranges was 22.63, meaning possible normal weight.

Mean of students with GPA of 2.40-3.49 who were < 16 years and 16-20 years were 22.96 and 23.81, depicting possible normal weight. The 21-25 years old students with a GPA OF 2.40-3.49 had a mean of 25.61, representing possible overweight. The total mean within the 2.40-3.49 GPA, was 24.84, depicting possible normal weight. Students with GPA of 3.50-4.49 and who were within the 16-20 years and more than > 25 years had mean of 24.39 and 21.68 respectively, also reflecting possible normal weight. However, the 21-25 years old students with a GPA of 3.50-4.49 had a mean of 26.72, indicating possible overweight. The total mean across the three age ranges was 24.69, meaning possible normal weight. The 21-25 years old students who were 4.50-5.00 GPA achievers had mean of 21.22, meaning possible normal weight and a mean of 16.14 for the < 16 years, representing possible severe underweight. The overall mean,

across all age ranges and GPA was 24.18, meaning possible normal weight though with a mean of 26.11 for students who are < 16 years representing possible overweight.

Data on class level and different health education achievements on mean BMI is also shown in Table 3. At the 100, 200, 300 and 400 levels, mean BMI of 22.83, 19.42, 21.60 and 23.34 respectively were calculated for the 1.50-2.39 GPA achievers, representing possible normal weight. The overall mean BMI across all levels for the 1.50-2.39 was 22.63 and this indicates a possible normal weight. For the 2.40-3.49 GPA achievers, BMI mean scores of 23.53, 23.17 and 22.54 were also obtained for the 100, 200 and 300 level students respectively, meaning a possible normal weight. However, a mean of 31.91 representing an obese health condition was obtained among the 400 level students with a GPA achievement of 2.40-3.49. On a grand base, a mean value of 24.84 indicating a possible normal weight was obtained for the 2.40-3.49 GPA.

Table 3. Age range and different health education achievements based on mean BMI of university students

Category	Age range						
	< 16	16 – 20	21 – 25	> 25			
	Mean±SD	Mean±SD	Mean±SD	Mean±SD		F	p
1.5-2.39	32.41±0.00	22.56±3.69	20.54±1.10	21.90±0.00	Age range	1.120	0.346
2.4-3.49	22.96±2.04	23.81±6.48	25.61±6.94	-	Different health education achievements	0.873	0.459
3.5-4.49	-	24.39±3.67	26.72±6.04	21.68±5.43	Age range*different health education achievements	0.861	0.511
4.5-5.00	-	16.14±0.00	21.22±2.05	-			

Within the 3.50-4.49 GPA, mean BMI of 21.62 and 23.55 were obtained for the 200 and 400 level students respectively. At this GPA, the 100 level students had a mean of 24.69 indicating a possible normal weight. Across all levels at the 3.50-4.49 GPA, a BMI mean of 24.69 representing a possible normal weight was obtained. The 4.50-5.00 GPA for the 100, 300 and 400 level students had BMI mean of 18.50, 23.43 and 19.37 respectively. These fell within the possible normal weight. In addition, a total mean BMI of 19.95 was obtained for the 4.50-5.00 achievers. An overall assessment of the mean scores of 23.84, 22.62 and 22.53 for the 100, 200 and 300 students respectively showed possible normal weight across all GPAs. Conversely, a higher mean BMI of 27.69 was obtained for the 400 level students across all GPAs, reflecting a possible overweight. An overall mean BMI of 24.18 was obtained across all levels and GPA but with minority of the 400 level and 100 level having possible obesity and overweight for 2.40-3.49 and 3.50-4.49 GPA achievers respectively.

Data in Table 3 also shows the interaction and main effects of age range and different health education achievements on mean BMI of university students. The interaction effect was not statistically significant [F (5,75) = 0.861, p > 0.511]. No significant main effect was also recorded for age range [F (3) = 1.120, p > 0.346] and health education achievements [F (3) = 0.873, p > 0.459].

Data in Table 4 shows the interaction and main effects of class level and different health education achievements on mean BMI of university students. The interaction effect was not statistically significant [F (7, 73) = 1.650, p > 0.135]. No significant main effect was also recorded for class level [F (3) = 1.806, p > 0.154] and health education achievements [F (3) = 0.837, p > 0.478].

Discussion

Findings showed that the BMI of university students with different health education achievements is possible normal weight with majority of the participants (54.0%), with the possible normal weight having a GPA of 2.40 – 3.49 while the least number of them (4.6%), had a GPA of 4.50 – 5.00. This present finding implies that the lower the knowledge acquired through exposure to health education experiences the higher the chance of having possible normal weight. The possible

normal weight is somewhat equated to normal BMI when all things are equal. This finding is consistent with evidence that noted that majority university students have normal BMI (Ajayi, Kadiri & Ugbenyen, 2022). University students especially females that try to maintain a normal weight as their total BMI was normal at 23.98 0.74kg/m2 (Alhazmi, Aziz & Hawash, 2021). According to the present study, majority of the students have a GPA of 2.40-3.49 which is a potential 'second class lower division'. Students within this level of achievement seem not to be high achievers. It is consistent with finding of Aleidi, Elayah, Zraiqat, Abdallah and AL-iede (2020), that almost majority of the students in college had good GPA. This is inconsistent with the finding of Alhazmi, Aziz and Hawash (2021) that majority of female students of King Khalid University had high-degree academic achievement. This inconsistency could be attributable to differences in lifestyle practices with the females tending to pay more attention to their body image through what they eat and their healthcare seeking behaviour.

Table 4. Class level and different health education achievements based on mean BMI of university students

Category	Class level						
	100	200	300	400			
	Mean±SD	Mean±SD	Mean±SD	Mean±SD		F	p
1.5-2.39	22.83±4.25	19.42±0.00	21.60±0.00	23.34±4.77	Class level	1.806	0.154
2.4-3.49	23.53±5.71	23.17±4.66	22.54±2.67	*31.91±9.01	Different health education achievements	0.837	0.478
3.5-4.49	*26.08±4.76	21.62±1.80	-	23.55±5.87	Class level*different health education achievements	1.650	0.135
4.5-5.00	18.50±3.34	-	23.43±0.00	19.37±0.00			

Findings of the study also indicated that no significant interaction and main effects of gender and different health education achievements on mean BMI of university students was found. Finding entails that gender and GPA have no effect on mean BMI of the students. The main effect of gender on mean BMI found in the present study is inconsistent with results that indicated that a significantly higher mean BMI for males than females was found (D'Souza, Walls, Rojas, Evertt & Wentzien, 2015). It is also in line with the findings that BMI is unrelated with academic achievement and the higher the educational achievement of adults, the better health (Raghupathi & Raghupathi, 2020; Wehigaldeniya, Oshani & Kumara, 2017).

Findings also indicated that no significant interaction and main effects of age range and different health education achievements on mean BMI of university students was obtained. This finding means that age range and different health education achievements have no effects on the BMI of university students. Though the finding of Azare (2019) showed that significant difference in BMI for age groups 20-30 and 31-40 of the health education students was found, it is however, insufficient to ascribe the present finding to this claim. This present finding could probably be that the four years of health education experience may not be enough to have significant weight gain.

Findings revealed that no significant interaction and main effects of class level and different health education achievements on mean BMI of university students was found. From the present findings, class level has no effect on mean BMI of university students. Irrespective of the class level, students' mean BMI was the same. Reason could be attributed to slow weight increase which can take longer time to reflect especially when conditions of environmental stress occasioned by academic demand is the case.

Conclusion

It was concluded that the BMI of university students with different health education achievements, in the Department of Health Safety and Environmental Education, is possible normal weight with majority of the participants with the possible normal weight having a GPA of 2.40 – 3.49, while the least number of them had a GPA of 4.50 – 5.00. In addition, gender, age range, class level and different health education achievements

had no effects on mean BMI of university students. University students' BMI could be attributable to other factors aside gender age range, class level and different health education achievements.

Recommendations

1. Health education students should be encouraged by lecturers to continuously apply knowledge of health education into healthy behaviours appropriate to maintain possible normal weight.
2. Regulatory agency within the university campuses should be inaugurated to assist in distributing handbills on how to constantly maintain healthy normal weight.

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