THE ASSOCIATION BETWEEN NIGHT EATING SYNDROME (NES) WITH BODY MASS INDEX (BMI) AND DEMOGRAPHIC DATA AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS, KUBANG KERIAN, KELANTAN (USMKK)

By

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Dissertation submitted in partial fulfilment

of the requirements for the degree

of Bachelor of Health Science (Honours) (Dietetics)

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CERTIFICATE

This is to certify that the dissertation entitled "**THE ASSOCIATION BETWEEN NIGHT EATING SYNDROME (NES) WITH BODY MASS INDEX (BMI) AND DEMOGRAPHIC DATA AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS, KUBANG KERIAN, KELANTAN (USMKK)**" is the bona fide record of research work done by Mr "MUHAMMAD FARIS FIQRAN BIN HAIIRY HELMY @ KHAIRY" during the period from February 2024 to June 2024 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the degree of Bachelor of Health Science (Honours) (Dietetics).

DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research, and promotional purposes.

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HUBUNGAN ANTARA SINDROM MAKAN MALAM DENGAN INDEKS JISIM BADAN DAN MAKLUMAT DEMOGRAFI DALAM KALANGAN PELAJAR UNIVERSITI SAINS MALAYSIA, KAMPUS KESIHATAN, KUBANG KERIAN, KELANTAN (USMKK)

ABSTRAK

Sindrom Makan Malam (NES) ialah gangguan makan yang mempunyai ciri seperti episod berulang pengambilan makanan berlebihan selepas waktu makan malam atau pengambilan makanan pada waktu malam selepas bangun daripada tidur, selalunya disertai dengan insomnia dan perubahan emosi. NES telah mendapat perhatian kerana potensi kesannya terhadap kesihatan keseluruhan, terutamanya kaitannya dengan Indeks Jisim Badan (BMI) dan isu berkaitan obesiti. Kajian ini mengkaji proporsi Sindrom Makan Malam (NES) dan kaitannya dengan Indeks Jisim Badan (BMI) dan ciri demografi dalam kalangan pelajar di Kampus Kesihatan USM (USMKK). Kajian keratan rentas telah dijalankan, dengan 97 peserta melengkapkan soal selidik dalam talian yang dilaporkan sendiri, termasuk Soal Selidik Makan Malam (NEQ). Prevalens NES didapati 6.2%, dengan majoriti individu adalah perempuan (81.4%) dan Melayu (82.5%), dengan umur median 22 tahun (IQR=2). Median BMI ialah 20.8 kg/m² (IQR=5.71), dan 46.4% dikategorikan sebagai BMI normal. Walaupun keputusan menunjukkan bahawa bilangan responden dengan NES lebih tinggi dalam kategori lebih berat badan dan obes, ujian Fisher's Exact mendedahkan tiada perkaitan yang signifikan antara status NES dan kategori BMI (p=0.06). Korelasi Spearman menunjukkan tiada hubungan yang signifikan antara skor NEQ dan BMI (p=0.14). Tambahan pula, tiada hubungan yang signifikan ditemui antara NES dan maklumat sosiodemografi seperti jantina, umur, etnik, tahun pengajian atau bantuan kewangan. Penemuan menunjukkan bahawa ciri demografi sahaja mungkin bukan peramal kuat NES Kajian pada masa depan dengan sampel yang lebih besar dan lebih

variasi diperlukan untuk lebih memahami hubungan antara pembolehubah dan implikasi yang lebih luas dengan NES.

THE ASSOCIATION BETWEEN NIGHT EATING SYNDROME (NES) WITH BODY MASS INDEX (BMI) AND DEMOGRAPHIC DATA AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI SAINS MALAYSIA, HEALTH CAMPUS, KUBANG KERIAN, KELANTAN (USMKK)

ABSTRACT

Night Eating Syndrome (NES) is an eating disorder characterized by recurrent episodes of excessive food consumption after dinner or nocturnal ingestion after rising from sleep, often accompanied by insomnia and mood swings. NES has garnered attention due to its potential impact on overall health, particularly its association with Body Mass Index (BMI) and obesity-related issues. This study examines the prevalence of Night Eating Syndrome (NES) and its association with Body Mass Index (BMI) and demographic characteristics among students at the USM Health Campus (USMKK). A cross-sectional study was conducted, with 97 participants completing self-reported online questionnaires, including the Night Eating Questionnaire (NEQ). The prevalence of NES was discovered to be 6.2%, with the majority of individuals being female (81.4%) and Malay (82.5%), with a median age of 22 years (IQR=2). The median BMI was 20.8 kg/m² (IQR=5.71), and 46.4% were categorised as having a normal BMI. Although the result showed the higher prevalence of students with NES within overweight and obese category, Fisher's Exact test revealed no significant association between NES status and BMI categories ($p=0.06$). The Spearman's correlation revealed no significant relationship between NEQ scores and BMI ($p=0.14$). Furthermore, no significant relationships were discovered between NES and demographic variables such as gender, age, ethnicity, year of study, or financial assistance. The findings indicate that demographic characteristics alone may not be strong predictors of NES. Future longitudinal studies with bigger, more diverse samples are needed to better understand the connections between variables and broader implications on NES.

1.0 CHAPTER 1: INTRODUCTION

1.1 Background of Study

Night eating syndrome (NES) is an eating disorder marked by recurring bouts of night eating, shown by excessive food consumption after dinner or nocturnal ingestions after rising from sleep, which produce severe dysfunction and discomfort (Sakthivel, Hay & Mannan, 2023). It is commonly associated with symptoms such as insomnia and mood swings. NES has gotten much attention recently because of its possible influence on an individual's general health and well-being, notably its potential relation to BMI, a frequently used indication of obesity and related health problems. The illness is believed to be caused by the desynchronization of mood, sleep, satiety, and the circadian rhythms of food consumption, even though the exact cause of NES remains unknown (O'Reardonet al., 2004).

First identified in a study by Stunkard et al. (1955), NES was identified in an obese eighteen-year-old woman who had been binge eating and accumulating weight. NES was later given a more official diagnosis in 1992, which was defined as "morning anorexia, evening hyperphagia, and insomnia" (Stunkard, 1992). NES is defined as a "delay in the circadian timing of food intake" in 2010. At least two instances of nocturnal eating per week, or the ingestion of at least 25% of the daily calorie intake after the evening meal and before going to bed, are indicative of night eating syndrome (NES) (Allison *et al.*, 2010). An NES patient must also meet at least three additional criteria, which are not feeling hungry in the morning, having a strong desire to eat right after dinner and before

bed, experiencing insomnia for at least four nights per week, believing that food is necessary for sleep, and having a depressed mood or mood that worsens in the evening and/or at night (Runfola et al., 2014).

In the context of a student community, it is crucial to grasp the connection between NES and BMI. University students are in a phase of life where they often face significant lifestyle shifts and academic pressures that can influence their eating patterns. These alterations can make students more susceptible to developing NES and possibly encountering weight-related challenges. NES has become a significant and little-studied problem, especially among students. It is known as an irregular circadian rhythm of eating, with a significant amount of daily calorie intake happening throughout the evening and night (O'Reardon *et al.*, 2004). The understanding of the significant influence of disordered eating patterns on the health and well-being of this population is what motivates the inquiry into the relationship between BMI and NES among students, including other susceptible factors including demographic data such as gender and age. Research on NES and its correlation with BMI and demographic data among students holds significant importance for various reasons. Firstly, it can provide valuable insights to healthcare professionals and counsellors on campus, helping them understand the risks and obstacles that students face in managing their eating behaviours and weight. Secondly, by establishing a clear link between NES and BMI, we can facilitate the development of preventive measures and support programmes tailored to the unique needs of the student population.

1.2 Problem Statement & Study Rationale

Concern over Night Eating Syndrome (NES) and high BMI level is rising among students, especially in university environments. An unusual number of calories is consumed each day during the evening and night, which frequently corresponds with a decrease in consumption during the day (Baron *et al.*, 2013). This phenomenon is the hallmark of this illness. One of the most critical stages of a young adult's life is the move to a university. Significant lifestyle changes characterise this, including more pressure to perform well in academic and a rise in independence. These shifts could make kids more susceptible to the onset or aggravation of eating disorders, such as NES.

NES is a significant hazard to students' physical and emotional well-being. It interferes with the circadian cycle of eating and is frequently associated with psychological anguish, sleep disruptions, and metabolic anomalies (Potter *et al.*, 2016). University life is known for its erratic schedules, stress-induced eating, and disrupted sleep patterns, all of which contribute to an atmosphere that fosters the formation or amplification of NES. The influence of NES on student health, particularly its relationship with Body Mass Index (BMI), requires immediate examination. Furthermore, despite an expanding amount of research on eating disorders, there is still a significant vacuum in understanding the precise impact of NES on BMI among adolescents. This information gap highlights the importance of doing focused research to address the issues that students encounter in controlling their eating behaviours and general health. Understanding the link between NES and BMI is essential for detecting early signs of disordered eating in adolescents and designing focused interventions to prevent or manage these problems.

The rationale for this study stems from its ability to fill current gaps in university students' comprehension of NES and its association with BMI and demographic data. This study intends to give actionable insights to healthcare providers, counsellors, and academic institutions by identifying the intricacies and problems in students' eating behaviours and general health. The study is critical in addressing a gap in the literature and contributing to students' overall well-being. The academic setting provides an ideal intervention platform, making this study critical in developing personalised interventions and support programmes that address NES and its potential impact on BMI among students.

The findings of this study could have far-reaching implications for public health programmes aimed at preventing obesity and promoting good eating habits in young adults. Understanding the complex association between NES with BMI and demographic data should open the path for comprehensive interventions considering this demographic's particular needs and limitations. By addressing the underlying reasons for disordered eating behaviours in students, the study hopes to develop more effective and targeted interventions that promote healthy habits and overall well-being.

1.3 Research Questions

1. What is the body mass index (BMI) status of USMKK students?
2. What is the prevalence of Night-Eating Syndrome (NES) among USMKK students?
3. Is there any association between Night-Eating Syndrome (NES) with Body Mass Index (BMI) among USMKK students?
4. Is there any association between Night-Eating Syndrome (NES) with demographic data which are gender, age, race, year of study and financial assistance received among USMKK students?

1.4 Research Objectives

1.4.1 General Objectives

To assess the association between Night-Eating Syndrome (NES) with Body Mass Index (BMI) and demographic data among USMKK students.

1.4.2 Specific Objectives

1. To identify the body mass index (BMI) level of USMKK students.
2. To identify the prevalence of Night-Eating Syndrome (NES) among USMKK students.
3. To determine the association between Night-Eating Syndrome and Body Mass Index among USMKK students.
4. To determine the association between Night-Eating Syndrome with demographic data among USMKK students.

1.5 Research Hypotheses

Hypothesis I:

Null Hypothesis (H_0): There is no association between Night-Eating Syndrome with Body Mass Index (BMI) among USMKK students.

Alternative Hypothesis (H_1): There is an association between Night-Eating Syndrome with Body Mass Index (BMI) among USMKK students.

Hypothesis II:

Null Hypothesis (H_0): There is no association between Night-Eating Syndrome with demographic data among USMKK students.

Alternative Hypothesis (H_1): There is an association between Night-Eating Syndrome with demographic data among USMKK students.

2.0 CHAPTER 2: LITERATURE REVIEW

2.1 Literature Review

2.1.1 Definition and Prevalence of Night Eating Syndrome (NES) among students

Night Eating Syndrome (NES) refers to a specific pattern of disordered eating that is typified by frequent episodes of eating after waking up from sleep or by consuming an excessive amount of food in the evening or at night, frequently in conjunction with a decrease in food intake during the day. Most people with NES report not being hungry in the morning and ingesting most of their daily calorie intake in the late evening and early hours of the night. NES prevalence in the general population highlights the need for further exploration of its characteristics. Proposed research diagnostic criteria, including nocturnal eating frequency and associated symptoms like insomnia and mood disturbances, contribute to the understanding of NES's clinical features. Feelings of distress and difficulties with day-to-day functioning are frequently linked to this syndrome (Allison *et al.*, 2010).

A previous study in the USA showed that about 32.5% of university students had NES (Nolan & Geliebter, 2012). A study conducted among university students in Shah Alam, Malaysia, revealed a concerning prevalence of 23.4% for NES (Alam & Sariman, 2015). A separate study executed among students at public universities in Malaysia revealed that 12.2% of the participants were engaged in NES (Gan, Chin & Law, 2019). The local food environment significantly influences the dietary choices of university students. The presence of 24-hour or late-night restaurants in Malaysia facilitates convenient dining for students at night, enabling them to socialise and watch sports

activities in groups while ordering meals. This trend is prevalent among men (Ali & Abdullah, 2017).

2.1.2 Body Mass Index (BMI) among Students

BMI, a widely used measure of body fat based on weight and height, serves as a crucial indicator of health status and risk factors for various conditions, including obesity. Exploration of BMI and obesity prevalence among students is critical to understanding weight-related issues in this demographic. A study highlighted the general prevalence of overweight and obesity among Malaysian university students is higher than in some other countries, such as China, Colombia and Iran, pointing to the critical need for understanding the factors influencing weight status in this population (Radzi *et al.*, 2019). Weight gain during university years is likely during the transition into university life, which is a critical period when young adults' behaviours including dietary habits are conducive to change as they gain independence in making food choices (Deshpande, et al., 2009)

Obesity, or having a high BMI, has become one of the most severe threats to public health, particularly among university students. According to the World Health Organization (WHO), the worldwide obesity rate has almost tripled since 1975. In Malaysia, the obesity rate is the highest in East and Southeast Asia (World Health Organization (WHO), 2010). Malaysia's recent rapid development has changed people's lifestyles, which could be a factor in the rise in overweight and obesity. The 2019 National Health and Morbidity Survey by National Institutes of Health (NIH) stated that 30.4% of Malaysian adults were overweight, 19.7% were obese, and 50.1% were overweight overall (NIH, 2019). According to a survey conducted by university students across 22 low- and middle-income countries, 22% of university students were overweight or obese

(24.7% of men and 19.3% of women) (Peltzer *et al.*, 2014). It is demonstrated that obesity is a widespread problem among university students worldwide, including in Malaysia. States that among Malaysian university students, the prevalence of overweight and obesity was 21.7% and 16.8%, respectively (Radzi *et al.*, 2019).

2.1.3 Night Eating Syndrome (NES) and Obesity

In general, the intricate relationship between Night Eating Syndrome (NES) and obesity has been a subject of extensive investigation, revealing a nuanced interplay with varying degrees of association. Studies, such as those conducted by Harb et al. (2012) and Moizé et al. (2012), have identified small yet positive correlations, indicating that individuals exhibiting more pronounced night eating behaviors may tend to have higher Body Mass Index (BMI) values. On the contrary, research by Runfola et al. (2014) reveals a more complex result, indicating inconsistent or minimal relationships between NES severity and obesity. This difficulty stems from the diverse structure of NES, which includes features such as morning anorexia, mood disorders, and unique beliefs about food and sleep. Furthermore, the bidirectional interactions of NES and BMI provide further complexities, implying that the link is not unidirectional and that both parameters may influence one other.

Students may be more susceptible to the onset or aggravation of NES during this crucial time of transition to higher education, which is characterised by major changes in lifestyle, stress from assignments, and a growing sense of independence. It is imperative to comprehend the consequences of NES on weight control since it may increase students' susceptibility to obesity and related health issues (Ulhaq *et al.*, 2023). In addition, NES has to be specifically investigated in this population due to the unique difficulties and stressors that students encounter. Considering the fact that disordered eating behaviours

are common and can have adverse effects on students, this study aims to fill a significant existing body of knowledge by addressing a critical research gap.

The precise relationship between BMI and Night Eating Syndrome is still being researched. Given the unique obstacles that university students confront, including irregular schedules, academic stress, and lifestyle changes, it is critical to explore how disordered eating patterns, particularly NES, may contribute to BMI variances in this population. As a result, determining the relationship between Night Eating Syndrome and BMI in university students is critical not only for understanding weight-related difficulties in this demographic but also for influencing targeted interventions that consider the unique dynamics of university life.

2.1.4 Night Eating Syndrome (NES) and Body Mass Index (BMI) in Student Population with Different Demographic Characteristics

Building on the observation that non-obese individuals with NES tend to be younger than their obese counterparts (Marshall *et al.*, 2004), the current study aims to explore demographic data such as age and gender as potential moderators of the relationship between NES and body mass. This hypothesis is rooted in the idea that NES may precede weight gain, with age influencing the strength of the association.

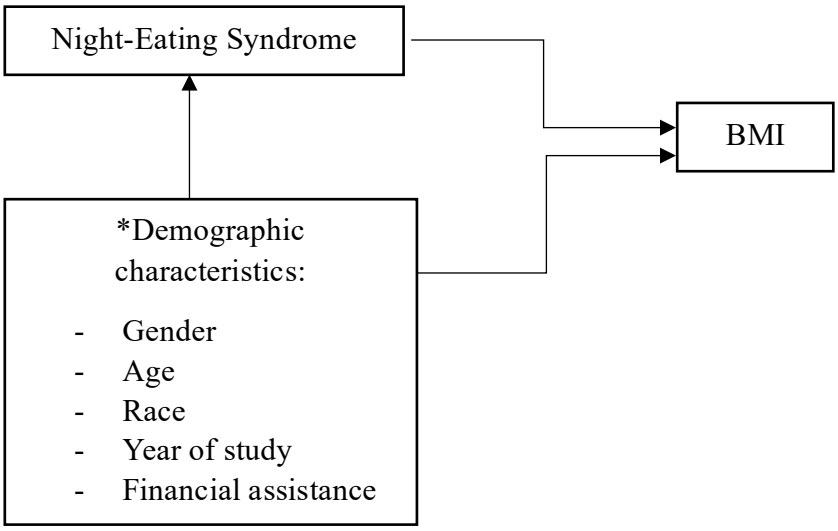
The association between BMI and NES has been found in participants aged 31 to 60, but not in those aged less than 31 or more than 60 (Meule *et al.*, 2014). Another study discovered a substantial relationship between NES and BMI in a group of community adults (mean age 44.5 years), while no such relationship was identified in a sample of university students (mean age 18.7 years) (Nolan & Geliebter, 2012). In contrast, 3 studies found a significant association between NES and BMI among university students in different countries which are Turkey, Germany, and Lebanon (Sakthivel, Hay & Mannan,

2023). Nevertheless, studies from the literature published between December 2013 and 2018 on the link between NES and BMI were mixed (Bruzas & Allison, 2019). The similar conclusion was obtained in a review of the literature on this topic published in 2012 (Gallant, Lundgren & Drapeau, 2012). Given the conflicting results, it is likely that unmeasured or currently unknown moderators alter the link between NES and BMI, causing some people to gain weight while others do not.

Males had a threefold higher likelihood of developing NES compared to females. This finding aligns with prior research showing males to be more susceptible to NES (Alam & Sariman, 2015). Findings from the 2005 Korean National Health and Nutrition Examination Survey revealed that males had a 1.9 times greater likelihood of becoming night eaters than females (Suh, Lee & Chung, 2012). In contrast, females were shielded from nocturnal eating due to their heightened preoccupation with excessive food consumption, body weight, and physical appearance (Pike & Dunne, 2015).

2.2 Conceptual Framework

Figure 1: Conceptual Framework of the Study



*Association between demographic data and BMI was not assessed in this study

Generally, body mass index (BMI) can be influenced by many factors, including the night-eating syndrome (NES) status and demographic characteristics such as gender, age, race and financial assistance received. NES can affect BMI by various reasons as it is related to poor eating control that leads to poor weight control. It is in line with the fact that night-eating may precede weight gain (Gluck *et al.*, 2008). Night eating syndrome may affect the circadian rhythm, lead to poor food choices, overconsumption of foods and sleep quality. These are also the factors that could greatly related to body mass index for the long-term. Apart from that, many studies found that age and gender are some of the demographic factors that may lead to NES such as by Nolan & Geliebter (2012) and Alam & Sariman (2015).

Besides that, Studies show that university students, especially those in their final years of study, have a tendency to have a higher prevalence of NES. According to a study done on Palestinian university students, factors like higher stress and lifestyle

modifications—which are frequently more noticeable in older students—may contribute to a higher prevalence of NES. These students may experience more irregular eating patterns and stress-related behaviors as their academic pressures increase over the years (Alwafa *et al.*, 2024). Numerous studies have shown how university students' BMI is affected by the academic year. For example, final-year students frequently have higher BMIs, which could be related to sedentary lives, bad dietary habits, and decreased physical activity as a result of increased stress and workload from university (Hamdan *et al.*, 2023).

Therefore, this study is interested to determine the association between the night-eating syndrome with body mass index and demographic data among university students in USM Health Campus.

3.0 CHAPTER 3: METHODOLOGY

3.1 Research Design

A cross-sectional study design is employed in this research study to collect data from respondents using questionnaires. Demographic data, the sign of NES, and BMI among USMKK students are determined using the questionnaire. The cross-sectional study design is appropriate as it enables the determination of the exposure encountered by the respondents. In addition, it is worth noting that this study design is characterised by its ease of execution and generally expedient nature (Setia, 2016). Furthermore, it is relatively inexpensive and allow researchers to collect information in relatively short time due to do not require follow up of the study subjects.

3.2 Study Area

This study is conducted including 3 faculties which are PPSK, PPSP and PPSG students in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan (USMKK). This location was chosen because USMKK students come from different backgrounds. It is a good place for conducting research as well as convenient and time saving for data collection.

3.3 Study Population

- Reference population:

Undergraduate students in Malaysia

- Target population:

Undergraduate students in Malaysia who study in USM Health Campus in Kubang Kerian, Kelantan

- Source Population/Sampling pool:

Malaysian undergraduate students who attend USM Health Campus in Kubang Kerian, Kelantan, including 3 faculties which are PPSK, PPSP and PPSG

- Sampling frame:

Malaysian undergraduate students which are in Year 1 to Year 5, including 3 faculties which are PPSK, PPSP and PPSG in Universiti Sains Malaysia, Health Campus, Kubang Kerian, Kelantan (USMKK)

3.4 Selection Criteria

3.4.1 Inclusion Criteria

The selection of subjects is based on:

- Participants must be aged 18 and above.
- Currently enrolled as undergraduate student Universiti Sains Malaysia (Health Campus).
- A Malaysian

3.4.2 Exclusion Criteria

Subjects are excluded when:

- Currently having health concerns such as blindness and chronic health diseases such as hypertension and diabetes that would limit the ability to participate.

3.5 Sample Size Estimation

3.5.1 Objective 1 & 2

One proportion formula is used to determine the approximate sample size for this study (Naing, 2003):

$$n = [(Z/\Delta)^2 \, p(1-p)$$

n = sample size

Z = value representing the desired confidence level

Δ = precision

p = anticipated population proportion

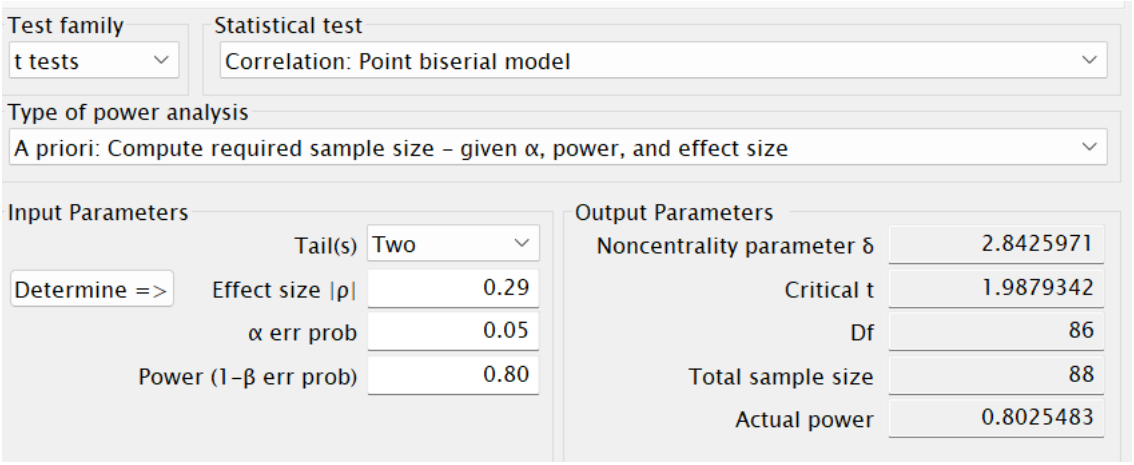
The value for Δ is 0.1 with the confidence interval 90%, therefore, the Z-score will be 1.65.

Table 3.1: Sample size estimation (Objective 1 & 2)

Objective	Anticipated Population Proportion Minimal Sample Size	Anticipated Population Proportion Minimal Sample Size
1	Percentage of overweight or obese university students in Malaysia = 25.9% (Kwan, Lee & Cheng, 2021)	$n = [(1.65/0.1)^2 \, 0.26(1-0.26)$ n = 52.38 ~ 52 respondents
2	Percentage of NES among university students in Malaysia = 38.6% (Kwan, Lee & Cheng, 2021)	$n = [(1.65/0.1)^2 \, 0.39(1-0.39)$ n = 64.77 ~ 65 respondents

3.5.2 Objective 3

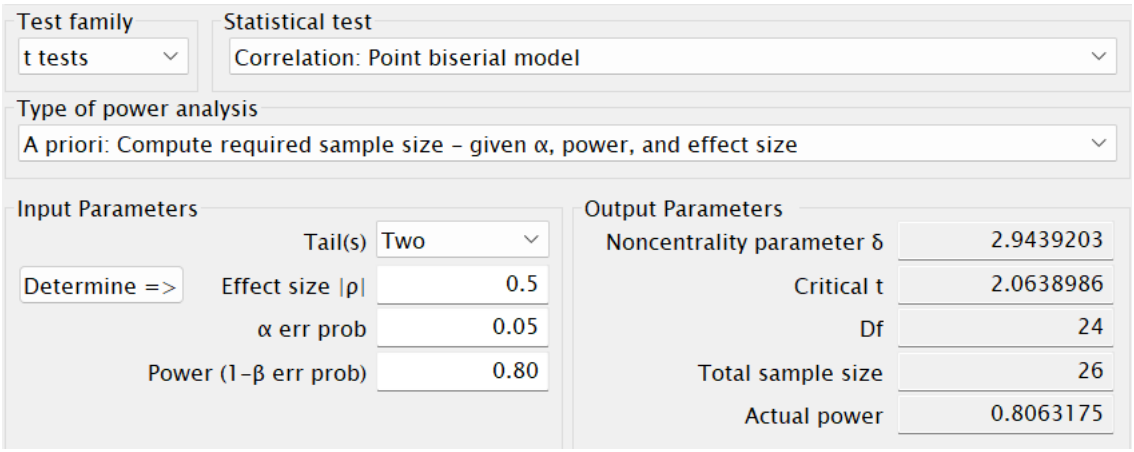
Figure 2: Sample Size Estimation (Objective 3)



The sample size for the third objective is determined using power analysis. Gpower software is used for power analysis to determine the minimal sample size required. The Gpower program is configured for a correlation (point biserial model) statistical test in order to do an a priori power analysis. An earlier study discovered a statistically significant correlation between NEQ scores and BMI (r = 0.29, p 0.001) (Gallant *et al.*, 2014). In the input parameters, the tails are set into two. The α (level of significance) was kept constant at 0.05, the power (1-β) was set at 0.80, and the effect size was equal at 0.29. Using these parameters, the power analysis reveals that a total sample size of 88 is required for this investigation, excluding a dropout rate.

3.5.3 Objective 4

Figure 3: Sample Size Estimation (Objective 4)



The sample size for the fourth objective is also determined using power analysis. Gpower software is used for power analysis to determine the minimal sample size required. The Gpower program is configured for a correlation (point biserial model) statistical test in order to do an a priori power analysis. In the input parameters, the tails are set into two. The effect size is set as medium, which is 0.5, the α (level of significance) was kept constant at 0.05, the power (1-β) was set at 0.80. Using these parameters, the power analysis reveals that a total sample size of 26 is required for this investigation, excluding a dropout rate.

As a conclusion, from all the calculations, the biggest minimal sample size is 88. By considering drop-out rates 10%, the final total respondents required for this study was **97.**

3.6 Sampling Method and Subject Recruitment

The convenience sampling approach was used to recruit the samples. Convenience sampling is a type of non-probability sampling. All subjects were chosen voluntarily. Undergraduate USMKK students who met the inclusion criteria, have no exclusion criteria, were willing to volunteer, and are interested in participating in the study are chosen to engage in the research, read the research information, sign the consent form, and complete the questionnaire. The first 97 students who completed questionnaire voluntarily were selected.

3.7 Research Tools and Materials

The Night Eating Questionnaire (NEQ) is a 14-item self-report questionnaire that uses a Likert-type scale for each question (0-4) to screen for NES symptoms, with higher scores suggesting more night eating severity. NEQ scores were analysed continuously as a measure of severity for this research, as well as categorically, with a value of >25 used as the cut-off that indicates night eating syndrome. Firstly, Questions 1-9 were required to be answered by all participants. If the participant gets 0 score on question 9, they should skip to question 15. Next, the participant should skip questions 13 and 14 if they obtained 0 score on question 12 (Allison *et al.*, 2008).

For the scoring calculation, Questions 1, 4 and 14 were reverse scored. Questions 1-12 and 14 were summed with the exclusion of item 13 as its purpose was to screen for parasomnia. Question 15 was not added to the total score but was used to identify symptoms. Besides, Questions 16 and 17 were used to confirm the presence of distress if NES was present. The total score might range between 0 to 52. High scores are linked to

more nighttime eating symptoms. The NEQ has been described as an accurate and reliable indicator of NES severity (Leman, 2010). NEQ has a satisfactory internal consistency with α=0.70 (Allison *et al.*, 2010).

There will be a part for self-reported demographic data (gender, age, race, year of study and financial assistance received) and self-reported BMI in the questionnaire to achieve all the objectives. The time taken to complete the questionnaire is expected to be around 15 minutes.

3.8 Operational Definition

1. Night Eating Syndrome (NES):

Night eating syndrome is a type of eating disorder that is characterized by hyperphagia in the evening with 25% or more of daily caloric intake after dinner with not less than two nocturnal awakenings during the week to eat food (Salman & Kabir, 2022).

2. Body Mass Index (BMI):

The ratio of weight (kg) over square of height (m).

3. Demographic Data

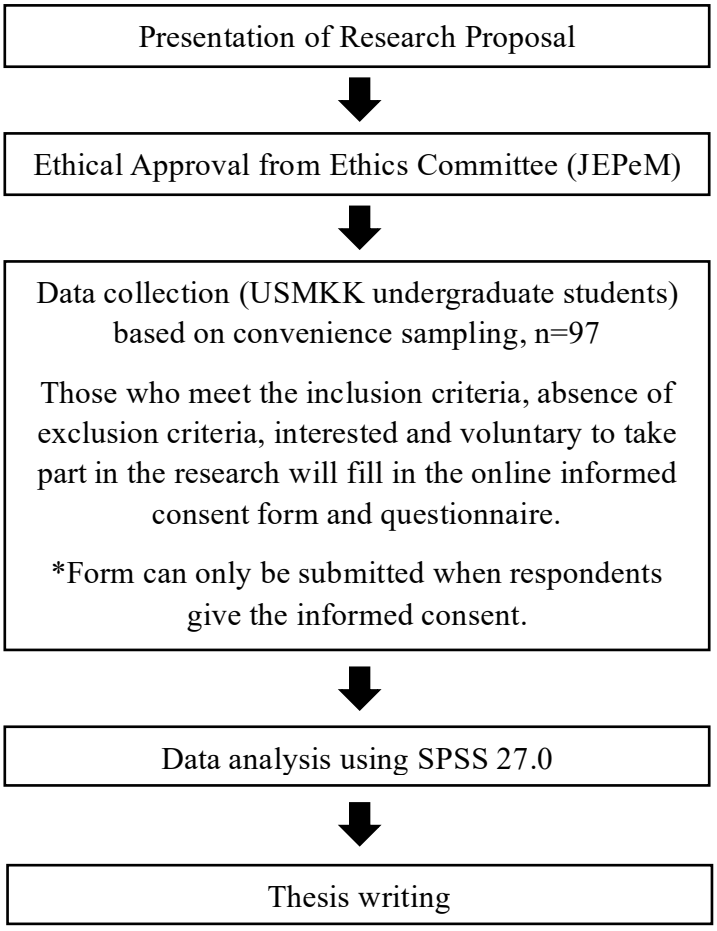
Demographic data is information about groups of people according to certain attributes such as age, sex, year of study, ethnicity and financial assistance received.

3.9 Data Collection Method

The data collection was initiated after obtaining approval from the Human Research Ethics Committee of USM. First, a Google Form link was created and distributed to the targeted population via social media platforms. This link directed participants to a Google Form containing an informed consent form and a set of questionnaires. Participants who met the inclusion criteria, were free from exclusion criteria, and were interested and willing to participate in the research, filled out the online informed consent form and questionnaire. Information about the study, including objectives, procedures, benefits, potential risks, and participants' rights and refusal, was provided before the survey. If participants agreed to participate, they signed the informed consent form given before starting the questionnaire. Participants' rights were secured, and they were free to withdraw from the study at any time without penalty or loss of benefits. However, participants who withdrew were disqualified from the study.

The link was repeatedly distributed until a total of 97 responses was received by the researchers. The first 97 responses collected were used in the data analysis. SPSS 27.0 was used to compute and analyze the data. Data were presented as grouped data and kept in a closed folder to ensure participants' identities remained confidential and their privacy was protected.

3.10 Study Flowchart



3.11 Data Analysis

Statistical analysis and evaluations were performed using the Statistical Package for Social Sciences (SPSS) version 27.0. At a 95% confidence level, statistical significance was determined at p less than 0.05. The demographic data, including gender, age, race, year of study, and financial assistance received, were self-reported. The body mass index status of respondents was determined using their self-reported weight and height as weight (in kilograms)/height (in metre)^2. Meanwhile, the status of night-eating syndrome (NES) was determined using the total NEQ score. All participants were categorized into two different groups: non-NES and NES. Scores higher than 25 indicated night-eating syndrome (Allison *et al.*, 2010). The Shapiro-Wilk test was used to determine the normality of a distribution. The result showed data was not normally distributed. Categorical data were displayed as frequency (%), while numerical data were presented as median and interquartile range (IQR). All data were screened and reviewed for accuracy, data mistakes, outliers, and inconsistencies prior to the primary analysis.

The relationship between selected socio-demographic (categorical) characteristics except age with NES status (categorical) were Fisher's Exact test as the expected count <5 was more than 20% of the cells. The Man Whitney Test was used to determine the relation between age and NES status. The Fisher' Exact test was also used to test the relationship between NES status and BMI status. The correlation between NEQ score and BMI was determined using Spearman's Rank-Order correlation test.

CHAPTER 4: RESULT

4.1 Sociodemographic Characteristics

The study sample consisted of a total of 97 participants, with a majority being female (81.4%, n=79) and a smaller proportion being male (18.6%, n=18). The participants' ages ranged from 19 to 31 years, with a median age of 22 years (IQR=2), indicating a relatively small age variation within the group. The most common age groups were 22 years (33.0%, n=32) and 21 years (26.8%, n=26), followed by 23 years (20.6%, n=20). A few participants aged 19, 24, 25, 26, 27, and 31, each representing 1.0% to 3.1% of the sample.

Ethnic background was primarily identified as Malay (82.5%, n=80), with smaller representations from Chinese (10.3%, n=10), Indian (4.1%, n=4), Dayak (2.1%, n=2), and Bajau (1.0%, n=1) ethnic groups.

The distribution across the years of study showed that more than half of the participants were in their third year (51.5%, n=50), followed by second-year students (25.8%, n=25) and first-year students (15.5%, n=15). There were fewer participants in the fourth (5.2%, n=5) and fifth years (2.1%, n=2) of study.

Regarding financial assistance, 40.2% (n=39) of the participants received scholarships, while 38.1% (n=37) relied on loans. Financial support from parents was reported by 18.6% (n=18) of the participants. Only a few participants were self-financed (1.0%, n=1), or received support from JPA (1.0%, n=1) or PTPTN (1.0%, n=1). Table 4.1 presents the frequency and percentage of socio-demographic characteristics of the study participants (N=97).