ASSESSMENTS OF PRACTICES, KNOWLEDGE AND DETERMINANT FACTORS ASSOCIATED WITH HABITUAL BEVERAGE CONSUMPTION AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI SAINS MALAYSIA HEALTH CAMPUS, KELANTAN

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ASSESSMENTS OF PRACTICES, KNOWLEDGE AND DETERMINANT FACTORS ASSOCIATED WITH HABITUAL BEVERAGE CONSUMPTION AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI SAINS MALAYSIA HEALTH CAMPUS, KELANTAN

by

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Dissertation submitted in partial fulfillment
of the requirements for the degree
of Bachelor in Nutrition with Honours

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CERTIFICATE

This is to certify that the dissertation entitled ASSESSMENTS OF PRACTICES, KNOWLEDGE AND DETERMINANT FACTORS ASSOCIATED WITH HABITUAL BEVERAGE CONSUMPTION AMONG UNDERGRADUATE STUDENTS IN UNIVERSITI SAINS MALAYSIA HEALTH CAMPUS, KELANTAN is the bona fide record of research work done by Ms HU JIA XIN during the period from April 2024 to January 2025 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 fulfillment for the degree of Bachelor of Nutrition with Honours.

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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 as a whole 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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Hu Jia Xin

Date: …12/1/2025……

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LIST OF ABBREVIATIONS

BMI	Body mass index
CVD	Cardiovascular disease
Non-SSBs	Non sugar sweetened beverages
SSBs	Sugar sweetened beverages
NCDs	Non-communicable diseases
WHO	World Health Organization

LIST OF APPENDICES

PENILAIAN AMALAN, PENGETAHUAN DAN FAKTOR PENENTU YANG BERKAITAN DENGAN KEBIASAAN PENGAMBILAN MINUMAN DALAM KALANGAN PELAJAR SARJANA MUDA DI KAMPUS KESIHATAN UNIVERSITI SAINS MALAYSIA, KELANTAN

ABSTRAK

Pengambilan minuman manis (SSBs) yang tinggi dikenalpasti sebagai salah satu faktor utama yang menyumbang kepada penyakit tidak berjangkit (NCDs). Oleh itu, memahami jenis dan corak pengambilan minuman harian serta faktor pemakanan dan gaya hidup yang berkaitan dalam kalangan orang dewasa muda adalah penting bagi mencegah risiko NCDs pada masa hadapan. Objektif utama kajian ini adalah untuk menentukan corak pengambilan minuman harian serta hubungannya dengan faktor demografi, indeks jisim badan (BMI), amalan pemakanan, gaya hidup, dan persepsi terhadap keutamaan rasa manis dalam kalangan 195 pelajar sarjana muda di Kampus Kesihatan, Universiti Sains Malaysia. Kajian ini juga bertujuan untuk menilai tahap pengetahuan peserta mengenai pengambilan minuman. Kajian ini menggunakan soal selidik pra-pilot bagi menilai pengambilan 30 jenis minuman biasa. Data pemakanan dan tahap aktiviti fizikal turut dikumpulkan. Persepsi terhadap keutamaan rasa manis dinilai menggunakan skala Likert 10 mata. Soal selidik dehidrasi dan soal selidik pengetahuan pra-pilot telah digunakan untuk mengukur tahap pengetahuan peserta berkaitan pengambilan minuman.

Purata jumlah pengambilan minuman harian peserta ialah 2.32 liter, dengan pengambilan minuman bukan SSBs melebihi SSBs (2.1 L berbanding 0.3 L). Lelaki menunjukkan pengambilan minuman berkarbonat (P<0.001) dan minuman tidak berkarbonat (P<0.05) yang lebih tinggi. Terdapat perbezaan ketara dalam pengambilan harian SSBs apabila dibandingkan dengan BMI (P=0.025) dan pengambilan makanan segera (P=0.022). Pengambilan bukan SSBs dan minuman sukan menunjukkan perkaitan signifikan dengan tahap aktiviti fizikal (masing-masing P=0.022 dan P<0.001). Keutamaan terhadap rasa manis menunjukkan korelasi positif dengan pengambilan SSBs (P=0.002, r_s = 0.214). Terdapat perbezaan corak pengambilan minuman ringan antara jantina. Pengambilan SSBs yang tinggi dikaitkan dengan amalan pemakanan yang kurang sihat dan keutamaan rasa manis. Pengambilan bukan SSBs dan minuman sukan berkait rapat dengan tahap aktiviti fizikal yang lebih tinggi. Penemuan ini menekankan keperluan untuk strategi kesihatan awam dalam mempromosikan amalan pengambilan minuman yang sihat dalam kalangan pelajar kolej.

ABSTRACT

High consumption of sugar-sweetened beverages (SSBs) is regarded as major determinants of non-communicable diseases (NCDs). Understanding the habitual beverage intake types and patterns and its associated dietary and lifestyle factors among young adults is important to prevent NCDs risk in later life. The main objective of the study was to determine habitual beverage intake and its association with demographic factors, body mass index (BMI), dietary and lifestyle practices, and self-perception of sweetness preference among 195 undergraduate students in Health Campus, University Science of Malaysia. The study also aimed to assess participants' knowledge regarding beverage intake. A pre-piloted beverage questionnaire of 30 beverage types were used to assess habitual beverage intake. Dietary practices and weekly physical activity levels were gathered. Self-perception of sweetness preference was evaluated by a 10-point Likert scale. A dehydration questionnaire and a pre-piloted beverage knowledge questionnaire were used to evaluate participants' knowledge. Average total beverage intakes of these participants were 2.32 liters, with non-SSBs consumed more than SSBs (2.1 vs. 0.3 L). Males had significantly higher intakes of carbonated drinks (P<0.001) and non-carbonated drinks (P<0.05) compared to the females. Mean difference in SSBs daily intake was significant when accounted for BMI (P = 0.025) and fast-food intake (P = 0.022). Non-SSBs and sport drink intake showed a significant association with physical activity level (P = 0.022 and P < 0.001 respectively). Sweetness preference showed a weak positive correlation with SSBs intake (P = 0.002, r_s = 0.214). The findings highlight gender differences in the consumption patterns of soft drinks. High SSBs intake was driven by unhealthy dietary practices and higher sweet taste preference. Non-SSBs and sport drinks consumption was significantly associated with physical activity. These

highlight the need for effective targeted public health strategies to encourage healthy beverage consumption behaviors among collegiate students.

CHAPTER ONE

INTRODUCTION

1.0 Overview of the study on habitual beverage consumption

Habitual beverage consumption refers to the regular, routine intake of beverages by an individual which encompasses the types and quantities of drinks that a person typically consumes as part of their daily diet. It considers the frequency and amount consumed over a certain period. Based on a calculation of 80% of the daily total fluid requirement indicated in the European Food Safety Authority, it is advised that males consume 2 L per day and females 1.6 L per day of drinkable water (Xiao & Zhang, 2023). However, the daily water requirement is influenced by several factors, including body weight, temperature, physical activity, and caloric intake (Xiao & Zhang, 2023).

It is well-known that hydration plays a vital role in regulating body temperature, lubricating joints, supporting the functions of the bowels, bladder, and kidneys, improve cognitive function and energy levels as well as safeguarding sensitive tissues such as the spinal cord (Sikalidis *et al.*, 2020; Sims *et al.*, 2022). Numerous population-based epidemiological studies had documented a positive and significant association between the amount of daily water intake and all-cause mortality risk (Zhou *et al.*,2021), in which the amount of water intake of all types had significantly associated with lower risk of all-cause mortality. On the other hand, another study looking on types of beverages intake had found that the risk of mortality of all-cause was higher among those had consumed greater intakes of sugar sweetened beverages (SSBs) than that of artificially sweetened

beverages (ASBs), fruit juices, coffee, tea, plain water, low fat milk, and full fat milk (Ma *et al.*,2023).

Consumption of types and quantity of beverages provide different in its nutritional and caloric composition, with each offering unique health advantages or in some case result in potential health risk. A recent study of Vieux and her colleagues (2020) among 22,716 populations aged >4 years-old and above had showed that average daily fluid intakes of all types (approximately 2.7L), including water itself (1.1 liter), fluid of other beverage types (1.0 liter), and the moisture from food (0.6iliters), whereby daily fluid intakes had attributed to about 16.6% of the daily total energy, 26 - 29% calcium intake, 22–28% vitamin C intake, and 35 - 36% total sugar intake among Australian adults. A substantial body of evidence shows that maintaining proper and good hydration habits is crucial for supporting optimal human health outcomes (Liska *et al.*, 2020).

Pattern and Trends of types of fluid consumption

The studies conducted across Argentina, Brazil, Mexico, Uruguay, China, and Indonesia reveal mean total fluid intake of adult ranging from 1.7 to 2.3 liters per day (Stookey & König, 2018). In China and Indonesia, carbonated sweetened drinks make up a small portion of adults' beverage consumption, accounting for only 4%, while milk and sweetened ready-to-drink tea and coffee represent over 15% of their beverage intake (Stookey & König, 2018). In Indonesia, drinking water is the primary fluid consumed with meals, making up 84% of fluid intake at mealtimes, which contrasts with the pattern observed in Brazil, Uruguay, Argentina, Mexico, and China, where other beverages, rather than water, dominate mealtime fluid consumption (Stookey & König, 2018).

Based on the recent reported conducted in populations in US has indicated that the trend and consumption of SSBs has reduced, with significant increase in water intake (Vieux *et al.,* 2020), even though decreases in overall total fluid intake in younger adults (Colburn & Kavouras, 2021). This may indicate a shift in beverages intake behaviors related to fluid type or composition rather than volume consumption (Sim *et al.*,2022).

On the other hand, there has been 37% rise in global per capita coffee consumption over the last 20 years, mostly driven by growing demand in the Middle East and North Africa (84.2%) and upper-middle-income nations (86.1%) (Quadra *et al.,* 2022). Research among Chinese adults revealed a consistent increase in caffeine intake over a 14-year period, with median caffeine intake among male consumers rising from less than 0.5 mg/day in 2004 to 51 mg/day in 2018, and among female consumers from less than 0.5 mg/day to 25 mg/day (Ye *et al.,* 2023). Moreover, it has been observed that the consumption of energy drinks is on the rise, with 51% of college students in the United States reported to be regular consumers. This trend is mirrored in other developed nations such as Australia, Canada, and Italy. The widespread use of caffeine across the globe can be attributed to its significant impact on alertness, endurance, focus, and productivity (Zagkos *et al.,* 2024). By contrast, fluid cow milk has experienced a decline in consumption across all age groups in United State (USDA, 2022). Despite being considered as one of the principal nutritious food sources and linked to various health benefits, daily per capita consumption of fluid cow milk has declined by approximately 50% from approximately a cup in 1970 to about half cup in 2019 (Ricklefs *et al.*,2023; Stewart &Kuchler.,2022).

Concisely, as a fundamental component of daily intake, the selection of beverages by individuals can significantly influence the nutritional quality of their overall diet. For this reason, assessing beverage consumption patterns is imperative, as the insight gained could guide the formulation of recommendations aimed at promoting informed choices.

1.1 Problem statement

A cross-sectional study conducted among young adults in China showed that approximately 80.1% of the participants did not meet the total water intake recommended by China, while 50.0% did not meet the recommendation by The European Food Safety Authority (Zhang *et al.*,2019). The unawareness of minimum water intake was 28.4% among adults based on a survey from four cities across China.

In another study by Jiang and his colleagues (2020) which involved 80,085 adults in New York City, it was found that young adults between the ages of 18 and 24 drank the most sugar-sweetened beverages and the consumption gradually increased from 2015 to 2017. Daily intakes of ≥2 servings of sugar-sweetened beverages (SSBs) were shown to be substantially associated with a 59% increased risk of mortality related to cardiovascular disease, according to a population-based longitudinal study conducted in Taiwan on 288,747 young adults aged 20 to 39 (Chen *et al.,* 2022). Additionally, survey conducted in the United States indicated that 91.1% of undergraduate students regularly consumed caffeine with 9.5% reported exceeding the recommended daily dosage of 400 mg (Riera-Sampol *et al.,* 2022).

Since 1990, the age standardized incidence rate and age standardized disability adjusted life years rate for the burden of early onset type 2 diabetes in young adults have

substantially increased globally (Xie *et al.*,2019). Based on Global Burden of Disease Study, 16, 300 global deaths due to diabetes (type 1 and 2 combined) occurred in people younger than 25 years and 73·7% were classified as due to type 1 diabetes (GBD collaborators,2022). Besides, study among individuals aged 15 to 24.9 years in Brazilian demonstrated that excess weight and adiposity were more prevalent among young adults compared to adolescent, together with a higher prevalence of physical inactivity during leisure time (Previdelli *et al.*,2021).

Given that individuals entering college often begin living independently, their overall dietary habits, including beverage choices, may change significantly. Establishing healthy beverage consumption habits is crucial, as beverages are an important part of overall dietary habits. These early patterns can influence long-term health and persist into adulthood.

1.1.1 Significance of the study

To the best of our knowledge, most existing research on young adults' beverage consumption has concentrated on specific types of beverages, like sugar-sweetened beverages (SSBs), with only a few studies examining all types of beverage consumption. One of the limitations is that research tends to overlook the broader spectrum of beverage choices available to young adults which may play an important role to overall nutrient intake. The consumption of water per unit weight (ml/kg) was found to have an inverse relationship with waist circumference, body fat mass, and body weight among young adults (Laja *et al.*,2020). Since a better body composition appears to be associated with higher fluid intake, improving water intake and balance may help young adults in good

health maintain their weight and avoid becoming overweight or obese (Laja *et al.,*2020). Beverages contribute significantly to daily energy intake, with studies showing they account for nearly 17.4% of mean daily energy intake (Rebuild *et al.,*2022). In addition to providing hydration benefits, beverages can play a crucial role in supplying essential nutrients to young adults. For instance, milk serves as a beverage rich in essential nutrients such as calcium and vitamin D. Conversely, the improper consumption of beverages, exemplified by frequent intake SSBs, can significantly compromise their health.

Different factors are known to influence obesity-related attitudes, including age, gender and socioeconomic status, but education was the strongest predictor (Dlamini *et al.,* 2024). To the best of our knowledge, there is very few studies examining young adults' knowledge and awareness regarding hydration, nutritional aspects, and health benefits and adverse effects associated with beverages intake. In an online survey experiment, a health education intervention, through media and public health campaign, resulted in changes in obesity-related attitudes in adults (Dlamini *et al.,* 2024). Hence, identify the knowledge and factors that influence young adults' beverage consumption practice and beverage choices can provide valuable insights for public health intervention aimed at promoting healthier beverage consumption among this demographic group.

The aim of the present study was aimed to assess habitual beverage consumption patterns among undergraduate students in Health Campus, USM. Additionally, the study was also aimed to determine their knowledge about dehydration, hydration and nutritional aspect of specific types of beverages. This study also aimed to determine determinant factors

aoociated with habitual beverage consumption patterns including socio-demographic, body mass index (BMI), dietary and lifestyle practices and self-perception of sweetness preference. Nutrition knowledge can influence consumers' ability to identify healthy foods and manage diet-related chronic diseases (Bhawra *et al.*,2023). By identifying the factors that influence beverage choices among young adults, tailored education programs can be developed to promote healthier beverage consumption habits within this demographic.

1.2 Research Questions

i. What are the habitual beverage consumption patterns (types, frequency, and quantity of common beverages consumed) among undergraduate students in USM Health Campus?

ii. What is the level of knowledge about dehydration, hydration and nutritional aspect of specific types of beverages among undergraduate students in USM Health Campus?

iii. What is the mean difference in beverage consumption across sociodemographic characteristics among undergraduate students in USM Health Campus?

iv. What is the mean difference in beverage consumption across BMI undergraduate students in USM Health Campus?

v. What is the mean difference in beverage consumption based on dietary and lifestyle habits undergraduate students in USM Health Campus?