

FACTORS AFFECTING THE INCREASE OF
HYGIENE-RELATED DISEASE AMONG
UNIVERSITY STUDENTS

BY

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PREFACE

This research study was conducted as part of the Final Year Project (FYP) requirement at Universiti Tunku Abdul Rahman (UTAR). The topic of this study, which focuses on hygiene practices among university students, was chosen due to the increasing concern over hygiene-related diseases in higher education environments.

The motivation for this research arose from the observation that many university students, despite having knowledge about hygiene, do not consistently practice proper hygiene behaviours in their daily lives. This issue is particularly important in shared environments such as campuses, where poor hygiene practices may contribute to the spread of infectious diseases. Therefore, this study aims to examine the factors influencing hygiene practices among university students, including knowledge, attitude, campus environmental hygiene, and peer influence.

The research was carried out using a quantitative approach through the distribution of online questionnaires to students at UTAR Kampar Campus. Data collected from respondents were analysed using statistical tools to identify relationships between the variables and to better understand the underlying causes of hygiene-related issues among students.

It is hoped that the findings of this study will contribute to raising awareness about the importance of hygiene practices and provide useful insights for universities and policymakers in promoting healthier campus environments.

ABSTRACT

The increasing prevalence of hygiene-related diseases among university students has become a growing public health concern, particularly in campus environments where shared facilities and close social interactions are common. This study aims to examine the factors influencing hygiene practices among students at Universiti Tunku Abdul Rahman (UTAR). Specifically, it investigates the impact of knowledge of hygiene, attitude towards hygiene, campus environmental hygiene, and peer influence on students' hygiene practices. A quantitative research design was adopted, using a structured questionnaire distributed to UTAR students. A total of 377 respondents were selected through simple random sampling to ensure representativeness. The collected data were analyzed using Statistical Package for the Social Sciences (SPSS), including reliability tests and multiple regression analysis to determine the relationships between variables. The findings reveal that knowledge of hygiene, campus environmental hygiene, and peer influence have significant positive relationships with hygiene practices among university students. In contrast, attitude towards hygiene was found to have an insignificant relationship. These results indicate that while students may possess positive attitudes, it does not necessarily translate into actual hygiene behaviour. Environmental factors and social influence play a more critical role in shaping students' daily hygiene practices. This study contributes to a better understanding of hygiene-related behaviours in higher education settings and provides practical implications for university administrators and health policymakers. Improving campus sanitation facilities, promoting hygiene awareness, and leveraging peer influence can effectively enhance hygiene practices among students and reduce the risk of hygiene-related diseases.

(242 words)

Keywords: Hygiene Practices, Knowledge of Health, Attitude on Health, Campus Environmental Hygiene, Peer Influence

Subject Area: RA427 Public health. Hygiene

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LIST OF ABBREVIATIONS

WHO	World Health Organization
WASH	Water, Sanitation, and Hygiene
CI	Confidence Interval
DALYs	Disability-Adjusted Life Years
HAI	Healthcare-Associated Infections
SDI	Sociodemographic Index
FWBD	Food-and-Water-Borne Diseases
HODF	Household Open Defecation Free
HHC	Hand Hygiene Compliance
HCFs	Healthcare Facilities
RCTs	Randomized Controlled Trials
AMR	Antimicrobial Resistance
CC	Climate Change
NTDs	Neglected Tropical Diseases
MMA	Malaysian Medical Association
MOHE	Ministry of Higher Education
PHP	Poor Hygiene Practices
HWWS	Handwashing with Soap
TPB	Theory of Planned Behaviour

SAHBTPB	Scale for Assessment of Hand-Washing Behaviour in TPB
SEM	Structural Equation Modelling
SPSS	Statistical Package for the Social Sciences
VIF	Variance Inflation Factor
SDG	Sustainable Development Goal

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CHAPTER 1: INTRODUCTION

1.0 Introduction

In chapter one, the research background is first explained. Then, the problem statement is used to discuss the issues related to this study. Following by research objectives, questions and hypotheses are stated respectively. After that, the importance of overseeing this study is being described. Next, the summary of the content in each chapter is given in the chapter layout. Lastly, a conclusion outlines the main points in chapter one.

1.1 Research Background

Over the past two decades, hand-hygiene science and practice have advanced substantially, reshaping prevention of healthcare-associated infections (Lotfinejad et al., 2021). The best preventive method to lower infections linked to healthcare is to practise good hand hygiene and use alcohol-based hand rub (Lotfinejad et al., 2021). A quicker and more effective way to clean hands has been made possible by the WHO multimodal hand hygiene improvement strategy's worldwide implementation as well as ongoing efforts to switch from soap and water to alcohol-based hand rub (Lotfinejad et al., 2021). Unsafe drinking water, sanitation, and hygiene (WASH) services still present significant health risks despite historic advances since the sanitary revolution (Wolf et al., 2023a). Indeed, across the four specified outcomes, safe WASH could have prevented 1.4 (95% CI 1.3–1.5) million deaths and 74 (68–80) million disability-adjusted life-years (DALYs) in 2019 (Wolf et al., 2023a).

Based on the findings from Gallardo-Albarrán (2025), the spread of piped water and sewerage, the global 'sanitary revolution' had cut infant mortality on the order of 10–30% from about year 1850 to year 1950. Public health depends heavily on hygiene, and while developed nations typically have higher standards for hygiene, developing nations struggle to encourage and uphold proper hygiene habits (Al-Worafi, 2023). According to Bloomfield and Ackerley (2023), hygiene practices in our households and daily activities encompass routine actions such as food handling, toilet use, animal care, and laundry, as well as responses to heightened risk scenarios like flu seasons, epidemics, pandemics or when providing care for individuals more susceptible to infections. As stated by Meierhofer et al. (2023), an extra 22% of families made improvements to the toilet's cleanliness. There was a 20% increase in the number of homes with cemented floors. These noticeable gains in home cleanliness were linked to specifically lower odds ratios for fever, stunting and wasting, and *Giardia lamblia* infections (Meierhofer et al., 2023). Also, Mihalache et al. (2023) said that hand washing with soap and water has been shown to be a successful strategy for lowering the risk of contracting infectious diseases.

Healthcare-associated infections (HAI) are contracted while a patient is in the hospital and are responsible for more deaths globally than AIDS, tuberculosis, and malaria combined (Peters et al., 2022). The number of hygiene diseases has decreased over the last 25 years thanks to effective interventions like hand hygiene in patient care (Peters et al., 2022). Lack of access to handwashing stations is a major contributor to the overall burden of infectious diseases, even though it is only the third most significant risk factor for infectious disease, after solid fuel-related household air pollution and child malnutrition (Mao et al., 2024). It was discovered that the prevalence of infectious diseases brought on by a lack of access to handwashing stations was considerably higher in areas with a low sociodemographic index (SDI) and more severe in men (Mao et al., 2024).

Extreme climate change, a lack of access to clean water, sanitary facilities, and hygienic facilities act as multipliers, leading to a worse hygiene problems and obstructing advancement to resolving the problem (Amisu et al., 2024). In addition to removing vector habitats, extreme weather events and flooding may also create new places to breed, increasing the chance of dengue and food-and-water-borne diseases (FWBD) like cholera and leptospirosis (Zain et al., 2024). Moreover, Acosta-España et al. (2024) stated that flooding greatly increases the spread of hygiene diseases in a number of ways, which these include contaminating water supplies and fostering favourable conditions for disease vectors. Consequently, areas impacted by floods have a much greater occurrence of diseases like leptospirosis, cholera, dengue fever, and malaria (Acosta-España et al., 2024). It is essential to maintain good hygiene in our homes and daily lives to prevent the spread of infections and to show that public health hygiene needs to be reevaluated to meet present and future demands (Bloomfield & Ackerley, 2023).

Ntaro et al. (2025) illustrated how behavioural and structural factors affect various open defecation free status indicators in the recent years. Multivariable data analysis revealed a significant correlation between Household Open Defecation (HODF) status and participant gender, handwashing memory, latrine, and household cleanliness factors (Ntaro et al., 2025). Numerous individual factors, including gender, privacy, prior habits, level of knowledge and awareness, and the perceived advantages of enhancing sanitation and hygiene practices, all had an impact on sanitation and hygiene behaviour (Kabir et al., 2021a). Furthermore, the overcrowd along with rapid urbanisation make hygiene issues worse, highlighting the significance of suitable regulations and improvements to infrastructure in order to meet growing demand (Okesanya et al., 2024). Therefore, disparities in access to sufficient housing and Water, Sanitation, and Hygiene (WASH) services in urban areas are made worse by the fast rate of urbanisation (UNICEF, 2020). Urban WASH services are suffering from rising populations, which makes it challenging to sustain the high hygiene standards and provide a clean water source (Okesanya et al., 2024). Thus, Rahaman et al. (2023) demonstrated that insufficient sanitary services and a lack of access to clean water pose major health risks to people.

People have long employed specific techniques to control pandemics, despite the fact that ideas of infection and hygiene habits have changed over periods of time and space (Finlay et al., 2021). For example, escaping regions with epidemic diseases, physical separation, dividing healthy individuals from the sick ones, and using some groups, who are frequently the most susceptible to illness and death (Finlay et al., 2021). Nevertheless, it has historically been challenging to alter WASH-related behaviours through large-scale national programs (Aunger et al., 2024). A variety of initiatives have tried to tackle these poor rates of hand hygiene compliance (HHC), with varying degrees of success over the past few decades (Sands et al., 2020). Sands et al. (2020) stated that the effects tend to be minor to moderate, and there is little chance of long-term increases even though many of these programs have been effective in bringing about short-term improvements in adherence. Employers have the duty to supply hygienic facilities as part of workplace rules that broadly acknowledge the necessity of hygiene (Rutter et al., 2023).

In the other words, hygiene-related diseases are influenced by both environmental conditions and behavioural practices, and their relative contribution remains debated (Derseh et al., 2021). It is not clear, nevertheless, which behaviour modification techniques have effectively enhanced urban sanitation and hygiene standards (MacLeod et al., 2025). One essential requirement for high-quality care as well as infection prevention and control in healthcare facilities (HCFs) is the accessibility to water, sanitation, and hygiene (WASH) services (Hirai et al., 2021). However, there is a notable overlook for the critical role carers play in helping individuals with disabilities to fulfil their WASH responsibility and take part in daily activities (Wilbur et al., 2024). Some of the obstacles caretakers encounter when trying to access medical care in various countries include financial burdens, insufficient facilities and experts, limited access to emotional assistance, a lack of information about family planning, and time constraints (Ahmad et al., 2023). It implies that vital services play a much larger role in the adaptation process, especially for the most at risk (Dickin et al., 2020). Dickin et al. (2020) said that to

move 1 billion people from open defecation to more immune amenities, funding in basic sanitation facilities or actions change-focused hygiene efforts must be encouraged.

Finally, assumptions about issues with water, sanitation, and hygiene (WASH) programs may be far more prevalent (Underhill et al., 2025). The public health benefits of certain low-cost WASH interventions used today have been questioned in light of recent data from large randomised controlled trials (RCTs) (Ray & Smith, 2021). There are two medical crises that can be regarded as priorities for public health, which are antimicrobial resistance (AMR) and climate change (CC) (Lio et al., 2023). These controversies highlight the need for more multi-level, multi-sectoral, and combined methods to overcome the complex nature and interdependence of issues related to sustainable development, such as resource management, social justice, climate adaptation, and decarbonization (Lah, 2025). Calabrese et al. (2023) noted that the approach may include different dimensions like environmental matters, the social shape and economic issues.

1.2 Problem Statement

Over the past ten years, the statistics from Ashraf (2025) showed the number of students enrolled in private and public universities and their associated colleges has increased substantially, reaching the number of 1.2 million students, which includes local and international students. Malaysia has produced a rising percentage of graduates with bachelor's, master's, and PhD degrees, among other levels of higher education (Ashraf, 2025). However, the rate of hygiene-related illnesses has increased among the highly urbanized student body (Kabir et al., 2021b). Abu et al. (2023) stated in their study that common infectious diseases had heavily affected Malaysia's low-income households as more as the number 2.91 million. Lots of people do not practice even the most basic hygiene, and billions do not use safely managed drinking water and sanitation services (Wolf et al., 2023b). Infectious

diseases, diseases linked to malnutrition, and diseases associated with unhealthy lifestyle choices are among the diseases of poverty that are more common in low-income populations (Abu et al., 2023). This covers helminth infections, malaria, diarrheal illnesses, and other NTDs, such as dengue (Abu et al., 2023).

In the other side, Chan et al. (2022) indicated that Malaysians are thought to have a low level of awareness concerning food safety and hygiene. There are 47.3% food poisoning cases per 100,000 people, as reported by the study, illustrating the incident rate of food and vector-borne diseases (Chan et al.,2022). The Star (2024) reported that in Malaysia, food poisoning is now one of the top five communicable diseases and a serious public health concern. MMA president Dr Azizan Abdul Aziz had said in the report, “It is not uncommon to see no separation in the handling of food and money. In many outlets, food is being prepared in unhygienic conditions while many food stalls and caterers are known to be operating illegally”, and this has shown the concerning of the problem, improper and the casual food hygiene, in Malaysia (The Star, 2024). Besides, a news report from The Sun (2025) reported that Universiti Putra Malaysia food safety expert Dr Noor Azira Abdul Mutalib said, “The working conditions of the small food vendors, such as exposure to pests, pollution, limited clean water and poor waste disposal, raise contamination risks, while many staff lack proper food hygiene knowledge due to insufficient training or certification”. WHO rates that 1.6 million people internationally fall in sick every day due to unsafe food and, foodborne illnesses remain a serious concern in Malaysia (The Sun, 2025).

Moreover, Cacciatore et al. (2025) highlights how rapid urban migration intensifies strain on housing and sanitation infrastructure in dense urban areas, increasing vulnerability to infectious and hygiene-related diseases. This study pointed out that the emergence of unfair living conditions, environmental risks, and restricted access to basic health services as a result of rapid urban growth, especially in low-and middle-income nations, has accelerated the onset of multimorbidity and increased the burden of non-communicable diseases (Cacciatore et al., 2025). As of, knowledge is still a crucial element of hygiene performance, which will

significantly affect hospital mortality and morbidity (Rahim & Ibrahim, 2022). According to Rahim and Ibrahim (2022), constant reminders and awareness campaigns are necessary to sustain high hygiene performance rates.

According to the study from Kabir et al. (2021b), university students in his country do not deeply care about the hygiene practices, which they are not fostering and maintaining the positive habits of hygiene actions and improved sanitary among their individual levels. And, so as Malaysia, Manan et al. (2021) noted that the cleanliness of the university toilets are always being pointed out dirty or unsatisfied by the students, which back to the reason is the irresponsible behaviour of the users who do not follow the appropriate hygiene practices in the washroom. In addition, an unsanitary restroom will increase the threat of disease transmission and damage the image of the institution overall (Manan et al., 2021). In order to be able to combat such behaviour significantly, Ismail et al. (2024) pointed out that school-based hygiene intervention activities such as hand-body mediation may enhance the hygiene knowledge, the attitudes and the practices to implement among college students. As well, Hazlyna et al. (2021), has conducted a research study during the COVID-19 pandemic, and they showed that non-pharmaceutical measures like hand washing, and face mask wearing are required to lower the risk of getting sick or infected. The treatment group was more positive regarding hygiene and hand washing than the control group, and students' attitudes towards hand washing refined as a result of education (Mohammadi et al., 2020).

Hygiene practices are very significant to restrain the potential of the spread of every communicable disease (Dwipayanti et al., 2021a). Apart from the health positive aspects, sustaining proper personal hygiene has helpful social consequences that are difficult to measure (WHO, 2021). With the example from WHO (2021), “access to improved WASH services has been shown to reduce stress, particularly among women and people living with disabilities, by increasing feelings of dignity, privacy and safety, and decreasing feelings related to disgust, fear of violence, injury and shame” (p. 25). Ineffective personal hygiene can contribute to a number of other negative outcomes, including hepatitis, trachoma, and schistosomiasis; illnesses

brought on by exposure to synthetic and natural chemicals, such as arsenicosis, fluorosis, and lead to any food poisoning incidents (Wolf et al., 2023b).

This issue may affect multiple societal critical incidents, like Wolf et al. (2023b) mentioned in their study, poor hygiene conditions have an impact on mental health, cognitive development, and educational outcomes. They also contribute to physical harm and sexual violence, especially against women and girls. About 65% fewer people with higher risk of depression were likely to maintain good personal hygiene, reflecting that psychological factors can seriously impair hygiene behaviour and raise susceptibility to infections linked to hygiene (Akter et al., 2025). As stated in the study from Kuandyk et al. (2025), despite high levels of personal hygiene knowledge, the physical compliance of hygiene practices among campus area was often obstructed by insufficient infrastructures or sanitary products, such as lacking soap supply and poorly maintained restrooms, directly impairing health and school attendance. Other than that, Zhang et al. (2025) indicates that comparing to peers with less hygienic practices, students who practice good personal hygiene habits such as taking regular showers and washing their hands are much more likely to perform better academically, demonstrating higher engagement and final grades.

In addition, the number of leptospirosis cases in Melaka rose to 80 between 1st January 2024 and 6th July 2024 compared to the number of 28 in the year 2023 (Bernama, 2024). Leptospirosis is a zoonotic infection, and environmental factors and human activity are the major risk factors of this disease (Philip & Ahmed, 2023). The increase was due to the outbreak of the disease at three recreational centers, however, there have been no deaths recorded so far (Bernama, 2024). Many cases occurred at recreational centers due to the spread of the disease among visitors. However, early measures such as cleaning at the locations have been taken with the monitoring of the Health Department and have been well-controlled (Bernama, 2024). If not, hematogenous routes in human bodies may enable the genus leptospiral to spread all through the host's organs, primarily the kidneys, liver, and lungs (Philip & Ahmed, 2023). Last but not least, a recent report in The Sun (2024) highlighted serious health risks posed by floodwaters in Malaysia. On 3rd

December 2024, Kelantan Health Department director Datuk Dr Zaini Hussin reported 4,894 cases of infectious diseases at temporary relief centers across the area. This exposure has led to cases of waterborne diseases such as leptospirosis and cholera, as well as skin infections (The Sun, 2024). Waterborne diseases are sickness brought on by pathogenic organisms that are spread through water, including viruses, bacteria, and protozoa (Shayo et al., 2023). Additionally, stagnant floodwater has increased mosquito breeding, raising concerns about dengue and malaria outbreaks (The Sun, 2024). Health authorities warned the public to avoid direct contact with floodwater and emphasized the importance of hygiene, including thorough handwashing, to mitigate health risks (The Sun, 2024).

Thus, it is essential to educate Malaysian university students the importance of upholding good hygiene practices and the repercussions of disregarding environmental and personal cleanliness. Lack of awareness and guidance on sustainable living can result in poor hygiene habits, inappropriate waste disposal, and the spread of disease in shared spaces like dorms and toilets in university settings, where students are frequently living independently for the first time (Zainuddin et al., 2024). Education has a significant impact on shaping the formation of responsible consumption behaviours. Students are more likely to develop sustainable habits that contribute to cleaner living environments when they have been provided with the right knowledge and abilities (Uzorka et al., 2024). Universities serve as long-term living and social settings that affect students' everyday activities in addition to being the locations for academic study. Students can learn about the importance of cleanliness. Universities also serve as role models by incorporating good hygiene and sanitation practices into all aspects of campus operations and encouraging students to take part in initiatives that promote personal hygiene, proper sanitation, and clean-living environments (Rana et al., 2023). By lowering the conditions that allow germs and viruses to spread, such as dirty facilities, inadequate waste management, and contaminated water supplies, these initiatives directly help to lower the number of illnesses linked to poor hygiene. The importance of incorporating hygiene education and health awareness into higher education is being emphasized more and more by international organizations and national education programs (Morrish & Neesam, 2021). Students are more likely

to adopt healthy hygiene habits and apply them in their daily routines when universities take the initiative to promote cleanliness and disease prevention through structured programs, health workshops, and campus-wide awareness campaigns (Suleiman et al., 2024). In addition to its beneficial impacts on the environment, encouraging good hygiene on campus makes living and learning healthier and helps stop the spread of illnesses among students brought on by unclean environments.

Multiple studies have examined hygiene habits and the prevalence of hygiene-related diseases in university settings worldwide since universities have a significant influence on students' health behaviors and awareness. For instance, studies conducted in China has demonstrated that foodborne disease outbreaks are frequently caused by university students' lack of basic hygiene and safety knowledge, such as proper food handling procedures in campus canteens and takeaway services (Chen & Feng, 2021). Additionally, research on oral health habits shows that many students rarely floss or get regular dental care, which might increase the dangers associated with poor hygiene (Tadin et al., 2022). To the best of our understanding, however, there hasn't been much research done on university employees' handwashing practices in Malaysia (Oo et al., 2021a).

The number of students entering Malaysia's private higher education institutions grew significantly between 2021 and 2024, from over 517,000 in 2021 (Ministry of Higher Education [MOHE], 2022) to over 759,000 in 2024 (MOHE, 2024). Around 590,000 students were enrolled in public universities at that time, which was a relatively stable number (MOHE, 2024). The balance of the student population has changed because of this expansion, with over half of all students enrolled in higher education now choosing private colleges and universities. The likelihood of hygiene-related problems like inadequate sanitation facilities, overcrowded living spaces, and poor waste management rises as more students live, study, and socialize on private campuses, often in lecture halls, dorms, and shared facilities. These conditions can increase the likelihood of disease outbreaks related to poor hygiene; hence it is crucial that private universities implement and maintain efficient

sanitation and hygiene procedures (World Health Organization, 2025). To better understand the specific factors causing the increase in hygiene-related diseases in universities, additional empirical study should be carried out there. Targeted studies that address this health issues can result in more effective intervention strategies and policy recommendations, ultimately fostering safer and healthier learning environments across all Malaysian higher education institutions (Zainuddin et al., 2024). This is because university students make up a significant and influential portion of future professionals and community leaders.

1.3 Research Objectives

1.3.1 General Objectives

The general objective of this study is to examine the hygiene practices among university students and identify the factors that affect the increase of hygiene-related diseases among them.

1.3.2 Specific Objectives

The subsequent specific objectives are formed to fulfil our general objective.

- 1) To examine whether there is a significant relationship between knowledge of hygiene and hygiene practices among university students.
- 2) To examine whether there is a significant relationship between attitude on hygiene and hygiene practices among university students.

- 3) To examine whether there is a significant relationship between campus environmental hygiene and hygiene practices among university students.
- 4) To examine whether there is a significant relationship between peer influence and hygiene practices among university students.

1.4 Research Questions

To provide a straightforward direction in our study, subsequent research questions are created.

- 1) Is there a significant relationship between knowledge of hygiene and hygiene practices among university students?
- 2) Is there a significant relationship between attitude on hygiene and hygiene practices among university students?
- 3) Is there a significant relationship between campus environmental hygiene and hygiene practices among university students?
- 4) Is there a significant relationship between peer influence and hygiene practices among university students?

1.5 Hypothesis of the Study

H1: There is a significant relationship between knowledge of hygiene and hygiene practices among university students.

H2: There is a significant relationship between attitude on hygiene and hygiene practices among university students.

H3: There is a significant relationship between campus environmental hygiene and hygiene practices among university students.

H4: There is a significant relationship between peer influence and hygiene practices among university students.

1.6 Significance of Study

This study is significant for the Ministry of Higher Education, as it highlights systemic and institutional factors including inadequate sanitation infrastructure, poor maintenance, and insufficient sanitary supplies that undermine student health on campus (Kabir et al., 2021c). This type of hygiene deficiencies specifically poor hand and body hygiene that having poor awareness among the campus may linked to elevated risks of gastrointestinal and respiratory infections, often resulting in increased absenteeism and diminished academic performance (Qasem et al., 2018a). By identifying these structural barriers, policymakers can prioritize resource allocation and infrastructure upgrades to safeguard public health in higher education settings.

Besides, this study highlights the factors that contribute to the rise of hygiene-related diseases among university students. With young adults spending most of their time on campus and often living in shared accommodations, poor hygiene practices can quickly lead to the spread of illnesses (Al-Rawi et al., 2021). Understanding what causes these issues, whether it's lack of awareness, poor sanitation facilities, or busy lifestyles can help universities develop better strategies to protect student health (Nurudeen & Toyin, 2020a). This research aims to shed light on these underlying causes so that effective preventive measures can be put in place.

From an academic institution perspective, this study contributes to the growing body of research on student health and hygiene behaviour. It offers valuable insights into how environmental, behavioural, and institutional factors may increase the risk

of hygiene-related diseases in university settings (Gouge et al., 2023). This study also highlights the requirement for targeted interventions such as hygiene awareness programs, gender-sensitive WASH facilities, and improved cleaning protocols within shared infrastructures (Kabir et al., 2021c). The findings can be used as a reference for future research or public health initiatives focusing on youth hygiene practices, especially within educational institutions.

Practically, the results of this research can guide university administrators, health officers, and campus facility managers in taking targeted action. This study empowers academic staff with evidence that perceived social norms, such as students believing their peers practice good hygiene are strongly associated with their own handwashing behaviours, highlighting peer modelling as a potent lever for health education programs (Dickie et al., 2017). By using the Multi-Theory Model framework, Fudolig et al. (2025a) stated that behavioural confidence and supportive changes in the civil atmosphere effectively complement both initiation and long-term adherence to appropriate handwashing among college students. For example, by identifying key problem areas, universities can improve access to clean facilities, launch hygiene awareness campaigns, and adjust policies to better promote healthy habits among students. Ultimately, these improvements could lead to reduced illness rates, fewer class absences, and a healthier student population, all of which contribute to a better university experience (Singh & Barnard, 2023).

Last but not least, the study holds global relevance for WHO & UNICEF, particularly their collaborative initiatives on WASH. The research contributes localized proof to inform frameworks like the JMP and GLAAS. This study also aligns with Sustainable Development Goal 6 (SDG 6), which underscores ensuring access to clean water, sanitation, and hygiene for all. University-level interventions in WASH not only improve student health but also contribute to global progress toward achieving SDG 6 targets on sanitation and hygiene (UNICEF, 2022). This may ensure availability and sustainable management of water and sanitation for all (Kabir et al., 2021c).

1.7 Chapter Layout

Chapter one outlines the research background and problem statement, explaining the growing concern about hygiene-related diseases among university students and the rationale for exploring this research area. This chapter introduces the research objectives, research questions, and hypotheses formulated to investigate the contributing factors to this public health issue. The significance of the study is also highlighted, emphasizing the importance of understanding hygiene behaviors and related factors in a university context to help reduce preventable illnesses.

Chapter two provides a review of relevant literature concerning hygiene practices, health education, and environmental or behavioral influences that contribute to the spread of hygiene-related diseases among students. It includes a review of previous research findings, definitions of key variables: knowledge of hygiene practices, attitudes toward personal hygiene, campus environmental hygiene, and peer influence on health behaviors, and the theoretical frameworks applied in these studies. The chapter presents previous research findings logically to establish the research gap and justify the study.

Chapter three focuses on research methodology. This includes an explanation of the research design, sampling method, and data collection instruments used to assess the hygiene behaviors and related factors among university students. The sample size determination, sampling techniques, and the procedures for data collection, processing, and analysis are described in detail to ensure the reliability and validity of the study.

Chapter four presents the results of the research. This includes descriptive statistics, preliminary data screening, and inferential analysis such as correlation or regression tests that address the research questions and objectives. The findings are discussed

in the context of the extent and nature of hygiene-related disease issues on campus and the contributing factors.

Chapter five provides a conclusion and discussion of the key findings. It explores how the results relate to existing studies and what they imply for improving hygiene standards among university students. The chapter offers recommendations for university administrations, health policymakers, and students themselves. It also discusses the limitations encountered during the research and suggests future research directions to further explore hygiene-related issues in higher education settings.

1.8 Conclusion

In conclusion, there has been growing concern about the increase in hygiene-related diseases among university students, which are frequently caused by poor living environments and hygiene practices. This problem may be worsened by factors like influence from peers, bad attitudes, poor campus environmental hygiene, and a lack of education. Thus, the purpose of this study is to identify the variables affecting the increase in diseases related to poor hygiene among UTAR students. The key variables to be examined are knowledge, attitude, campus environmental hygiene, and peer influence.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

Chapter two is organized in the following sequence. The first part is the review of literature on the dependent variable, which is the poor hygiene practices among university students. Secondly, its relationships with four independent variables, which are attitude towards hygiene practices, hygiene-related knowledge, peer influence, and campus environmental hygiene, are explained. Thirdly, the theoretical frameworks are discussed. The fourth section presents the conceptual framework. Lastly, the hypotheses for this study are formulated.

2.1 Review of Literature

2.1.1 Dependent Variable: Hygiene Practices

Poor Hygiene Practices (PHP) refer to inadequate personal and environmental hygiene behaviours such as lack of handwashing with soap, irregular sanitation use, and unsafe handling of water that increase the risk of communicable diseases (Shehmolo et al., 2021). While on the other side, proper hygiene habits act as safeguards towards respiratory and digestive infections, but poor hygiene practice scores are linked to a higher prevalence of these illnesses (Minda et al., 2024). PHP is always measured using a structured questionnaire that includes demographic information, health concerns, water drinking status, and aspects related to sanitation

and hygiene along with their satisfaction and conformance status in order to accurately assess hygiene levels (Sifullah et al., 2024). Based on the evaluation of 16 hygiene-related factors, such as the accessibility of handwashing stations, sanitation components, and overall cleanliness, approximately 4.0% of households were categorised as having "poor hygiene" (Daniel, 2021). The concept of Poor Hygiene Practices (PHP) as a dependent variable corresponds in nicely with this.

Hygiene practices are conceptualized as a collection of behaviours that collectively determine whether hygiene steps are carried out and are affected by personal ability, possibility, and motivation (Miller et al., 2020). White et al. (2020) stated that the target of their review is to determine and classify handwashing determinants, which are possible variables that affect how often people wash their hands. For example, social norms, a touch to any physical objects, habits and personal automaticity (White et al., 2020). In this model, poor hygiene practices are shaped by a broad range of influences at multiple levels from individual aspects like knowledge and attitudes. And, from contextual such as facility quality and water access as well as up to the structural aspect, normally the policy and gender norms (Thuong et al., 2020).

Measurement methods typically combine voluntary questionnaires, organised observations, and objective accuracy or sensor-based metrics, as each approach decreases different biases and fulfils differing knowledge requirements (Calderón-Villarreal et al., 2024). Rizk et al. (2025) showed that structured observation is frequently advised despite its expense and reactivity issues because self-report overestimates cleanliness behaviour. Composite WASH indices and integrated assessment tools are being used more to assess facilities, supplies, and hygiene behaviours collectively for projects and facility evaluation (Odjegba et al., 2024). Hennegan et al. (2020) mentioned that comparisons between studies are made more difficult by the significant variations in the definition and measurement of hygiene practices across different item lists and scoring systems.

2.1.2 Knowledge of Hygiene

Knowledge is defined in behavioural health sciences as the possession of factual information that individuals hold about specific domains, which shapes their beliefs and actions (Yehouenou et al., 2022). Besides, Yehouenou et al. (2022) stated that knowledge functions as a foundational determinant in behaviour change, influencing motivation and facilitating adherence. Thus, knowledge constructs the theoretical framework linking poor hygiene practices to behavioural issues, acting as a critical barrier in interventions aimed at improving hygiene compliance (Yehouenou et al., 2022).

There are growing arguments for the conflicting relationship between knowledge and hygiene practices. Significant results have been shown in both developed and developing countries. Paul et al. (2020) conducted their study in Bangladesh, which is a developing country. The research investigated the positive relationship between knowledge and hygiene practices. This study revealed a panic fuelled by a lack of knowledge about the facts related to communicable diseases and the necessity for the government to implement more focused and detailed awareness campaigns in an open and truthful way in order to boost public trust and guarantee more significant public involvement in mitigation efforts. Moreover, Barrett and Cheung (2021) conducted their study in United Kingdom, which is a developed country. They found that knowledge is correlated significantly with hand-hygiene behaviour in their study. This study showed that, in terms of knowledge formation, communications regarding the efficacy of hand hygiene and socially distant behaviours had been successful. Furthermore, Chatterjee et al. (2022) conducted their study in India, a developing country. They emphasized that an improved knowledge was positively associated with better handwashing habits. They showed that socioeconomic groups and districts differed in their understanding of various aspects of hand hygiene and in their use of handwashing with soap and water (HWWS) during critical times.

However, insignificant results have been showed in both developed and developing countries. Niyigena et al. (2023) conducted their study at Rwanda, which is a developing country. They stated that there was no hookup between knowledge and adoption of preventative practices during the COVID-19 pandemic. The study also shows that adherence to prevention practices and knowledge levels can differ significantly depending on time, place, level of education, and the particular knowledge dimensions being evaluated. In addition, Shrestha et al. (2023) indicated a negative relationship among knowledge and hygiene practices, where this study is operated in Nepal, a developing country. Higher educated individuals, those with medical trainings, and domestic workers knew lots about pandemics, but knowledge was not linked to actions or behaviours. Thus, the research stated knowledge and practice were not aligned. Likewise, Kordi et al. (2023) conducted their study at Iran, which is a developing nation. The review stated that there is no significant relationship between knowledge of prevention and preventive behaviours on the COVID-19 pandemic. It is important to implement appropriate educational programs to raise rural people's awareness and performance on the hygiene purpose.

Other than that, there are different sample sizes to study the relationship between knowledge and poor hygiene practices. The sample taken by Paul et al. (2020) had 1589 completed responses, which they used an online structured questionnaire to conduct the survey. The question items included 40 multiple choice question and questions about knowledge cover up to 13. The scores for each category were derived from the percentage of right answers to these questions, which received a cut point up to 80% of correct answers for all categories. Besides, the sample taken by Niyigena et al. (2023) had 292 valid responses, which using simple random sampling approach to decide 5% of quantitative survey respondents from the 5,769 community health workers from districts like Kirehe, Kayonza and Burera. They also conducted a sample size of 24 responses on qualitative surveys. Quantitative surveys are using a series of 12 True-False questions while qualitative surveys are using open-ended questions through phone calls and being recorded in audio mode.

In conclusion, previous research has shown mixed results on the relationship between knowledge and poor hygiene practices, with some declaring to important links and others finding no such affiliation. These conflicts might be disclosed by disparities in respondents' nations, sample sizes, and measurement scale utilized in the studies.

2.1.3 Attitude on Hygiene

In social psychology, attitudes are widely recognized as a critical determinant of behaviour. The Theory of Reasoned Action and the Theory of Planned Behaviour both emphasize that attitudes can predict individual actions, particularly when behaviours are under volitional control (Chen & Slade, 2025). This theoretical framework has been frequently applied to health-related behaviours, including hygiene practices, and provides a foundation for examining how students' attitudes shape their hygiene behaviours.

Many studies support the view that positive attitudes toward hygiene strongly influence actual hygiene behaviours among university students. For instance, a study in Malaysia found that students exhibited high levels of awareness and favourable attitudes toward hygiene during the COVID-19 pandemic, though these did not always translate into consistent practices (Hawary et al., 2024). Similarly, research in the United Arab Emirates demonstrated that students with positive attitudes toward hand hygiene were more likely to engage in proper practices, although knowledge alone was not enough to ensure consistency, underscoring the importance of comprehensive hygiene education (Al-Mohammed et al., 2024). In Malaysia, a 2023 study among medical students at the University of Cyberjaya revealed that while students had good knowledge and attitudes, their actual hygiene practices remained suboptimal, suggesting that factors beyond knowledge and attitude—such as environmental cues and institutional support—may also play a role (Kamaruddean et al., 2023).

Despite the evidence above, some research reports an insignificant relationship between attitudes and actual hygiene practices. For example, a 2025 study in Bangladesh showed that although university students possessed adequate knowledge and positive attitudes toward hygiene, their real-life practices were inconsistent (Rahman et al., 2025). Likewise, medical students in Afghanistan demonstrated strong knowledge and positive attitudes but poor compliance in practice (Kakar et al., 2023). This discrepancy, sometimes referred to as the “hygiene gap,” reflects the difference between students’ favourable attitudes and their actual behaviours (Majeed et al., 2025; Ntaote et al., 2024). Several factors explain this gap, including limited access to hygiene resources, lack of reinforcement from institutional facilities, and low perceived effectiveness of individual actions (Denijs & Sirichokchatchawan, 2024). For instance, even when students recognize the importance of handwashing, crowded facilities or insufficient supplies may hinder consistent practice (Bülbül Maras & Kocacal, 2024).

The type of student population under study also influences outcomes. For instance, nursing students in Saudi Arabia generally showed positive attitudes, but compliance in clinical settings was poor (Al Mohaithef, 2020). Dormitory students in Bangladesh demonstrated that attitudes significantly predicted oral health practices (Islam et al., 2025), while health science undergraduates in Turkey showed favourable attitudes but continued poor practices due to behavioural barriers (Hancer-Aydemir, 2020). In Indonesia, students with positive attitudes were less likely to engage in poor practices, such as inconsistent handwashing, during the COVID-19 pandemic (Sondakh et al., 2022). Similarly, Majeed et al. (2025) found that although Indian medical undergraduates had strong knowledge and positive attitudes, actual practice levels were slightly lower, with variations across academic years. By contrast, Çağaltay Kayaoğlu et al. (2025) showed that students in geriatric care programs demonstrated a stronger link between health perceptions and hygiene behaviour, indicating that specific educational contexts may shape outcomes. These

variations highlight that differences in field of study, level of education, and learning environment can strongly influence research findings.

In conclusion, the literature reveals two contrasting perspectives on the relationship between attitudes and hygiene practices among university students. The majority of studies confirm that positive attitudes significantly reduce poor hygiene behaviours, while a smaller number report weak or insignificant associations. These mixed findings may be explained by differences in respondents' academic backgrounds, levels of exposure to hygiene education, institutional support, and the statistical methods employed. Consequently, addressing these moderating factors is essential for future research to better understand how positive attitudes can be effectively translated into consistent hygiene behaviours among university students.

2.1.4 Campus Environmental Hygiene

For a new student, starting college and university can be a difficult time of transition. Many are living away from home for the first time, and they encounter many difficulties adjusting to living independently, such as financial, social, and academic demands (Worsley et al., 2021). Thus, a compliant campus environmental hygiene is very crucial to every student in the university to prevent causing mental illness or major infectious diseases. Campus environmental hygiene refers to the physical conditions and routine practices across university buildings and grounds that minimize environmental health risks and support student wellbeing (Ding et al., 2023). It typically encloses secure drinking water, sufficient sanitation and accessible handwashing infrastructures that are properly maintained on campus (Pereira et al., 2024). Additionally, it involves systematic environmental cleaning and disinfection as well as efficient solid-waste management to reduce contamination in learning environments (Or & Ching, 2024).

There are increasing arguments for the adverse relationship between campus environmental hygiene and poor hygiene practices. Significant results have been shown in both developed and developing countries. Serrem et al. (2021) conducted their study in Kenya, which is a developing country. This study examined the positive relationship between campus environmental hygiene and poor hygiene practices. They reported although knowledge or a correct attitude were often adequate, most of the students engaged in inadequate food-safety hygiene practices, and students explicitly cited lack of equipment or cooking facilities as a major contributor to poor practice. Moreover, Berhanu et al. (2022) operated their study in Ethiopia, a developing country. They indicated a direct and significant link between facility availability and hygiene practice. They mentioned that availability of handwashing facilities and the access to water and soap was independently associated with better handwashing practice. For example, students who had a handwashing facility at home were about 3.6 times more likely to practice proper handwashing. Besides, Alwan et al. (2024a) also pointed out the significant relationship between campus WASH availability together with maintenance and hygiene practices, where this study conducted in Lebanon, a developing country. The paper reports moderate awareness but variable hand-hygiene practice and shows significant differences in reported hygiene behaviour related to institutional and contextual factors like access to hand-hygiene resources, gender, university status.

However, insignificant results have also been showed in both developed and developing countries. Ibrahim et al. (2019) conducted a study in Malaysia, which is a developing country. They examined the relationship between students' hygiene behaviour and campus environmental hygiene. However, the results revealed that neither hygiene practices nor students' involvement levels significantly predicted environmental hygiene outcomes, whereas awareness showed a significant positive effect. Thus, this finding suggesting that personal hygiene behaviour alone may not be sufficient to improve environmental cleanliness within university settings.

Furthermore, there are different sample sizes to study the relationship between campus environmental hygiene and poor hygiene practices. The sample taken by Serrem et al. (2021) had 585 completed responses from different universities, which a multistage sampling was used to choose respondents. Besides, the sample taken by Ibrahim et al. (2019) had 100 valid responses. In addition, various scales have been developed by researchers and used in different studies to investigate the relationship between campus environmental hygiene and poor hygiene practices. Serrem et al. (2021) had taken different scales. First, five levels with a score ranging from 1 to 5 has been used, which shows “Strongly disagree” to “Strongly agree”. They also used a score to assess the frequency on the practices, which one = never; two = occasionally; three = sometimes; four = often; and five = always. While conducting the survey, Ibrahim et al. (2019) used a structured questionnaire with Likert-scale items to measure practices, awareness, and involvement, which similar with the method used by Serrem et al. (2021).

On the other side, university hostel settings are often forcing students to prepare and keep their food in the rooms which not designed for food handling. This situation linked to the gaps in food-safety practices and contributing to a higher risk of foodborne disease among residents (Serrem et al., 2021). Besides, Ikogho and Onoharigho (2025) had done research on hostel populations, showing that menstrual waste management and other sanitation needs in the residential areas are facing practical and infrastructural challenges. For example, they are lack designated trash cans for menstrual wastes, the access to clean water, and education to reduce in period shame (Ikogho & Onoharigho, 2025). Moreover, hostel residents' knowledge and reported practices have improved as a result of intervention studies and education campaigns on feminine hygiene, suggesting that focused hygiene education in hostels can support infrastructure improvements (Alva et al., 2021).

To conclude, previous research has shown mixed results on the relationship between campus environmental hygiene and poor hygiene practices, with some claiming to have significant connections and others discovering none at all. Differences in the

countries of respondents, sample sizes, and measurement scales used in the studies may reveal these conflicts.

2.1.5 Peer Influence

Peer influence has long been recognized as a key determinant of student behaviour in university settings. Peer groups frequently use shared habits, social norms, and group expectations to affect students' behaviors, especially personal hygiene. (Pertiwi & Nasiatin, 2022). According to social learning theory (Koutroubas & Galanakis, 2022), individuals tend to model their behaviours after their peers, especially when they value their peers' opinions or seek social acceptance. In university environments, where students are often exposed to new social groups, the influence of peers can either encourage or discourage proper hygiene practices. Poor hygiene practices, such as irregular handwashing, lack of sanitation, and neglect of personal cleanliness, can spread quickly in campus settings, particularly when these behaviours are normalized by peer groups (Al-Mamun et al., 2021).

Recent studies have increasingly highlighted the powerful effect of peer influence on hygiene behaviours among university students. In a 2021 study in Bangladesh, Kabir et al. found that university students were more likely to engage in proper hygiene practices, such as frequent handwashing and using sanitizers, when they were in peer groups that reinforced these behaviours. Peer influence was particularly strong in campus dormitories and shared academic spaces, where students often interacted with one another and observed each other's practices. The study concluded that positive peer pressure could significantly improve hygiene behaviours, but it also noted that negative peer influence could lead to students neglecting personal hygiene (Kabir et al., 2021d). A similar study in India (2022) by Madtha et al. examined the impact of peer groups on personal hygiene habits in university students. The study found that students in environments where hygiene was actively promoted by peers, such as those in health-focused courses, were more

likely to engage in consistent hygiene practices. Conversely, students in more social, informal settings where hygiene was not emphasized were found to exhibit poor hygiene habits, particularly regarding handwashing and sanitation practices (Madtha et al., 2022). This research highlights the dual role of peer influence: it can be both a facilitator and a barrier to good hygiene behaviours, depending on the social context.

Positive peer influence plays a crucial role in encouraging healthy hygiene behaviours. A 2023 study in Malaysia by Baba-Nalikant et al. demonstrated that when students in university dorms observed their peers actively promoting hygiene behaviours, such as proper disposal of waste, handwashing before meals, and sanitizing frequently touched surfaces, they were more likely to adopt these behaviours themselves. The study concluded that social modelling, where students mimic positive hygiene behaviours observed in peers, significantly contributed to better hygiene practices (Baba-Nalikant et al., 2023). Moreover, study by Park and Oh (2023) examined the factors influencing COVID-19 preventive behaviours among university students in South Korea. The research found that subjective norms, particularly those from friends and schools, significantly impacted students' adherence to preventive measures such as mask-wearing and hand hygiene. Students who perceived strong social expectations regarding hygiene practices were more likely to engage in consistent hygiene behaviours. This underscores the importance of fostering hygiene-positive campus cultures, where peer influence actively promotes collective responsibility for cleanliness.

On the flip side, negative peer influence can lead to the spread of poor hygiene practices among students. A 2021 study in Bangladesh by Kabir et al. found that university students who were part of social circles where hygiene was not prioritized tended to neglect personal cleanliness, particularly in shared spaces such as cafeterias, bathrooms, and lecture halls. The research noted that when hostel mates neglected practices such as cleaning shared bathrooms or disposing of waste properly, others in the same group tended to follow suit, which resulted in unhygienic living conditions across the hostel environment (Kabir et al., 2021d).

Similarly, a cross-sectional survey conducted by Nwadi et al. (2023) at the University of Nigeria, Nsukka, examined the perceived impact of poor hostel sanitation on student health. The study identified shared responsibility for waste disposal and overcrowding as structural contributors to unsanitary conditions. Although the primary focus was on infrastructure, these environmental shortcomings indirectly fostered norms of neglect among students, making poor hygiene behaviour more common and acceptable (Nwadi et al., 2023).

Various statistical methods have been employed in recent studies to explore the relationship between peer influence and poor hygiene practices. Structural Equation Modelling (SEM) has been widely used to assess the influence of peer pressure on hygiene behaviours. For example, Shitu et al. (2021) applied Structural Equation Modelling (SEM) among university students in Ethiopia to examine factors influencing oral hygiene behaviour. Their findings showed that subjective norms which represent peer influence, had a significant positive relationship with students' intention to practice good oral hygiene, confirming that students who observed peers with positive hygiene habits were more likely to adopt similar behaviours. Similarly, Multiple Regression Analysis was applied by Arba et al. (2022) in Malaysia, where the results showed that positive peer influence accounted for a significant percentage of variance in students' hygiene practices, especially in communal settings like cafeterias and dorms.

In contrast, Hierarchical Regression Analysis has been used by Park and Oh (2023) in South Korea, where the results showed that peer influence was the strongest predictor of hygiene practices when combined with institutional hygiene campaigns. The study concluded that peer influence alone could significantly increase hygiene compliance when institutional support was also present. This highlights the importance of integrating peer pressure with formal hygiene education and institutional policies to ensure positive hygiene outcomes.

The role of peer influence in shaping hygiene behaviors is not universal and can vary based on respondent characteristics and context. For instance, Chao (2023) found that university students in health-related majors exhibited significantly higher engagement in health-promoting behaviors (e.g., health responsibility, nutrition), indicating stronger internalized health norms in health disciplines. In comparison, non-health students demonstrated lower scores, particularly in health responsibility and nutrition domains, suggesting that peer influence related to hygiene and health behaviors may be less emphasized and reinforced in non-health academic environments (Chao, 2023).

In conclusion, the literature on peer influence and poor hygiene practices among university students reveals both positive and negative effects. While peer influence can significantly promote better hygiene practices, particularly when hygiene is normalized and reinforced by peers, it can also contribute to poor hygiene behaviours when students are exposed to negative group norms. The mixed results can be attributed to differences in peer group characteristics, institutional reinforcement of the university. Future research should continue to explore the interplay between peer influence, institutional policies, and social norms to better understand how to leverage peer influence in improving hygiene practices among university students.

2.2 Theoretical Framework

2.2.1 Theory of Planned Behaviour

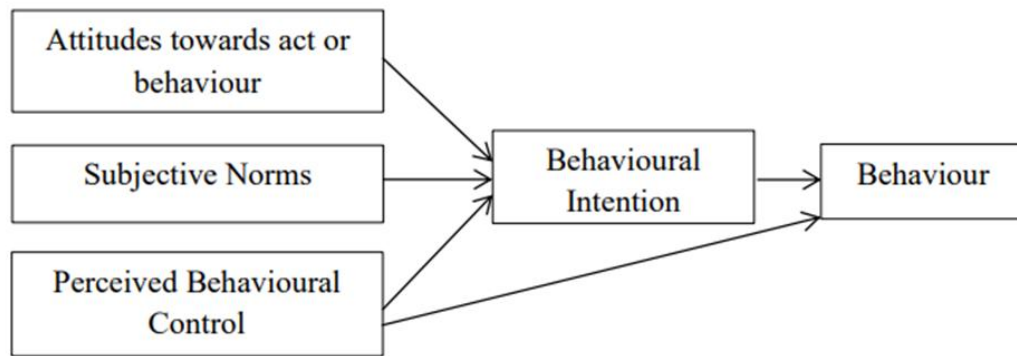


Figure 2.1. Theory of Planned Behaviour. Adapted from Ajzen (1991).

The Theory of Planned Behaviour (TPB), developed by Ajzen (1991), proposes that behavioural intentions serve as the primary determinants of actual behaviour, and these intentions are influenced by three core constructs: attitudes, subjective norms, and perceived behavioural control. In the context of university students' hygiene practices, such as handwashing, sanitation compliance, and disease prevention. TPB has recently been applied in empirical research to understand and predict behaviour (Sin & Rochelle, 2022). For example, Maraş and Kocaçal (2024) conducted a study among nursing students in Turkey using the "Scale for Assessment of Hand-Washing Behaviour in the Framework of TPB" (SAHBTPB). Their findings revealed that intention was a significant predictor of hand hygiene behaviour, and factors such as gender, academic level, and prior hygiene education were positively associated with higher SAHBTPB scores (Bülbül Maraş & Kocacal, 2024). Similarly, Li et al. (2021) applied an extended TPB model to examine COVID-19 preventive behaviours, such as mask-wearing and handwashing among university students in Beijing. The model incorporated not only the core TPB constructs (attitude, subjective norm, perceived behavioural control) but also factors such as institutional climate and perceived risk. Their findings highlight the importance of both personal beliefs and environmental context in shaping hygiene-related behaviours in higher education settings (Li et al., 2021). These findings confirm that TPB is a relevant theoretical lens for examining hygiene-related behaviours among university students, since it incorporates both individual factors (attitudes, knowledge) and social-environmental influences (peer influence, campus facilities).

2.3 Conceptual Framework

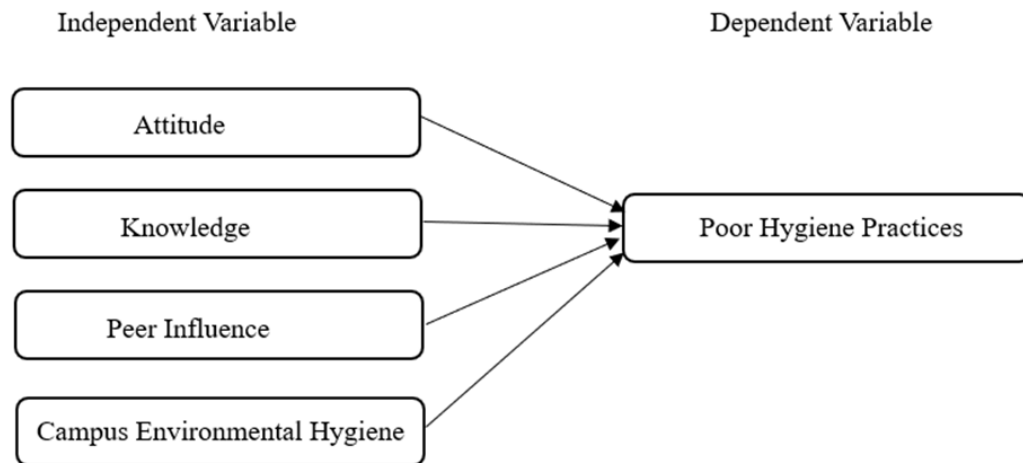


Figure 2.2. Conceptual Framework.

Figure 2.2 presents a conceptual framework for examining the factors affecting the increase in hygiene-related diseases among university students at UTAR, which is based on the earlier theoretical models covered in the previous section. Four independent variables are included in this conceptual framework which are attitude towards hygiene practices, hygiene-related knowledge, peer influence, and campus environmental hygiene. It is concluded from earlier research that these independent variables will have a major impact on the prevalence of diseases linked to poor hygiene practices among university students. Thus, the reliability of the conclusion will be investigated using this framework. In the part that follows, the hypotheses will be developed using this framework.

2.4 Hypotheses Development

2.4.1 Knowledge of Hygiene and Hygiene Practices among University Students

First, knowledge can be significantly related to the hygiene practices. Corbo et al. (2024) confirmed that a person with an improved hand hygiene knowledge may be more compliance in reducing healthcare-associated infections (HAIs). Compared to students with high knowledge, those with low knowledge are 1.6 times more likely to behave poorly when handling hygienic actions (Inovasanti et al., 2024). As a result, university students with high knowledge of hygiene have a lower probability to implement poor hygiene practices.

Many studies have analysed the influence of knowledge on the hygiene practices and found a significant influence of knowledge on the poor hygiene practices in developing countries like United Arab Emirates (Mohamed et al., 2024a). University students' hand hygiene practices, attitudes, and knowledge were investigated in this cross-sectional survey. The study discovered that although students had favourable attitudes and a moderate level of knowledge, their actual adherence to good hand hygiene practices varied. The results highlight the necessity for colleges to enhance their health education initiatives in addition to practical hygiene interventions. Following hand hygiene guidelines is therefore essential to preventing the spread of infections and maintaining community health and safety (Mohamed et al., 2024a). Nonetheless, significant differences have been noted between genders and academic fields in terms of students' knowledge, attitudes, and practices around the hand hygiene. They also have found that university students' use of handwashing and personal hygiene interventions has significantly reduced their rates of absenteeism and sick leave (Mohamed et al., 2024a).

Besides, Alomari et al. (2023) had done their study at Jeddah City. They carried out a cross-sectional study to investigate the connection between nursing students' self-efficacy and their understanding of hand hygiene. Although nursing students are

expected to model and uphold hygiene standards in their professional roles, the researchers stressed that nursing students are in a unique position because their actual knowledge and confidence in applying these practices during their studies may vary significantly. The results showed that students with greater hand hygiene knowledge also tended to report higher levels of self-efficacy, indicating that awareness is a key factor in determining confidence to take action. However, some students continued to exhibit lapses in their daily hygiene behaviours, highlighting the fact that knowledge alone did not ensure consistent practice. This draws attention to a significant gap in higher education: merely giving students information is insufficient; colleges and universities also need to create encouraging environments, offer consistent reinforcement, and incorporate real-world experiences that boost students' self-esteem and sense of responsibility. The study adds to the increasing amount of evidence supporting the need for a more comprehensive approach to hygiene education, especially in professional training programs where students' behaviours will have a direct impact on patient safety in the future (Alomari et al., 2023).

In addition, Alwan et al. (2024b) discovered that knowledge is significantly related to the poor hygiene practices among university students. The results indicated that although most participants exhibited a moderate level of awareness, with an average score of 7.6 out of 12, there was still a noticeable discrepancy between what people knew and how regularly they followed good hygiene. Interestingly, women and those with more education had higher knowledge and behaviour scores, indicating that demographics influence hygiene outcomes. The study highlights that in order to guarantee healthier campus environments, raising awareness and encouraging practical hygiene practices must coexist in academic settings.

Therefore, the first hypothesis developed for this study is:

H1: There is a significant positive relationship between knowledge of hygiene and hygiene practices among university students in UTAR.

2.4.2 Attitudes on Hygiene and Hygiene Practices among University Students

Attitudes on hygiene play a central role in shaping students' actual hygiene behaviours. A positive attitude often reflects students' belief in the importance of cleanliness and disease prevention, which motivates them to adopt proper hygiene practices. In Malaysia, Ayyappan et al. (2021) studied final-year nursing and optometry undergraduates and found that students who reported stronger positive attitudes toward hand hygiene were also more likely to demonstrate good hygiene behaviours in practice. This indicates that attitudes directly influence students' tendency to engage in or avoid poor hygiene practices within the university context. Likewise, Yıldırım and Güler (2022) investigated COVID-19 preventive behaviours, including mask wearing and handwashing among Turkish university students and reported that positive attitudes, together with perceived control, were strong predictors of intention and actual compliance with hygiene practices. These findings collectively confirm that attitudes are a critical factor shaping hygiene-related behaviours in higher education settings.

Further supporting evidence is drawn from more recent cross-cultural studies. For example, a cross-sectional survey among 378 students in the United Arab Emirates (UAE) conducted between December 2022 and March 2023 reported that although knowledge levels were moderate (~62%), students exhibited good attitudes (~74.7%) and high reported practices (~86.8%) toward hand hygiene (Mohamed et al., 2024b). The findings highlighted that gender and field of study shaped the strength of these attitudes, reinforcing the idea that more positive hygiene attitudes are aligned with stronger behavioural intentions. These outcomes indicate that attitudes remain a consistent determinant of hygiene compliance in university populations.

Outside the Gulf region, parallel insights emerge from European and African contexts. A Hungarian study of health science students found that strong food safety and hygiene knowledge was closely linked to the cultivation of positive attitudes that, in turn, reinforced hygienic practices (Keczeli et al., 2024). In Qatar, female students in Public Health and Nutrition programs reported high levels of oral hygiene knowledge, but their varying attitudes were reflected in uneven levels of compliance with best practices (Elwadia et al., 2024). These examples show that even when knowledge levels are strong, the degree of positive attitude significantly influences whether hygiene behaviours are consistently applied in practice.

Meanwhile, studies in Sub-Saharan Africa and South Asia highlight the complex interplay between attitude and behaviour. In northern Tanzania, university students showed high knowledge (82.6%) and positive attitudes (78.4%) toward food safety, yet their actual hygiene practices were far lower (31.9%) (Masiku et al., 2024). This suggests that while positive attitudes are important, they may not always translate into good hygiene behaviour when barriers such as resource availability or habit formation intervene. Similarly, in Bangladesh, Haque et al. (2021) examined compliance with COVID-19 guidelines among 1,822 university students and found a striking gap between attitudes and behaviours. Although 64% of students reported positive attitudes toward preventive measures, only 0.22% demonstrated high levels of actual compliance (Kumar et al., 2021). A more focused case study at Jahangirnagar University further identified poor hygiene handling practices and linked them to gaps in food-safety education, reinforcing the importance of institutional supports to help students translate positive attitudes into consistent hygienic behaviours (Afrin et al., 2024).

Adding another dimension, research among Turkish associate-degree students in Home and Elderly Care programs (2025) demonstrated a bidirectional relationship: positive attitudes toward hygiene were associated not only with better hygiene behaviours but also with stronger health perceptions (Çağaltay Kayaoğlu et al., 2025). This indicates that fostering positive attitudes may have wider benefits

beyond immediate hygiene practices, potentially contributing to long-term health-oriented lifestyles among young adults.

Therefore, drawing on evidence from Malaysia, Türkiye, the UAE, Hungary, Qatar, Tanzania, and Bangladesh, attitudes remain central in shaping the hygiene practices of university students. Whether in the form of hand hygiene, food safety, or oral care, the literature demonstrates that more positive attitudes generally foster stronger hygienic behaviours, though structural or contextual barriers can moderate this effect.

Based on these findings, the second hypothesis developed for this study is:

H2: There is a significant positive relationship between attitudes on hygiene and hygiene practices among university students in UTAR.

2.4.3 Campus Environmental Hygiene and Hygiene Practices among University Students

Moreover, campus environmental hygiene can be significantly related to the poor hygiene practices. In educational institutions, a better sanitation and hygiene practice are beneficial for preventing infections, limiting the spread of pathogens, and fostering overall health (Kabir et al., 2021e). Islam et al. (2021) do state that to lower the transmission rate, worldwide efforts are being made to wear protective gear such as masks and gloves, wash hands with soap, use antiseptic solutions frequently, and keep social distance. As a result, campus environment may create a safer and more pleasant learning environment for everyone by promoting good hygiene practices among students.

Some studies have examined the positive influence of campus environmental hygiene and poor hygiene practices in developing countries. For instance, in Bangladesh, Kabir et al. (2021e) found that university students' knowledge of hygiene remains inadequate if universities fail to provide a good environmental hygiene for students or staff in the campus. For example, irregular cleaning services, poor toilet maintenance, and insufficient water supplies, which this pointing out that structural and contextual drawbacks hinder even well-informed individuals from practicing a proper hygiene.

Further support comes from Ethiopia, where Azanaw et al. (2021) investigated sanitation and hygiene practices among university students and reported that environmental conditions such as overcrowded dormitories, unproper waste management, and insufficient handwashing stations. These kinds of weak environmental conditions directly influenced poor hygiene behaviours. The study showed that even when students expressed clear attitudes towards preserving hygiene, the absence of the accessible and the well-maintained facilities limited their capacity to practice these behaviours efficiently. Azanaw et al. (2021) also concluded that improving environmental hygiene infrastructure is very important to maintain positive hygiene consequences and decrease the risk of communicable disease transmission among university populations.

In addition, Duong et al. (2021a) found that a significant influence of campus environmental hygiene on poor hygiene practices among university students. They similarly observed that although nearly all surveyed Vietnamese university students understood the importance of handwashing, but fewer than half of them were washing their hands frequently. This condition happened daily after coughing or sneezing, which this gap was largely due to inconsistent availability of sanitation facilities and hand hygiene stations within university campus areas. Their findings emphasize the critical link between environmental hygiene provisions and the ability of students to translate awareness into daily habits, especially during public health crises. (Duong et al., 2021a).

Thus, the third hypothesis constructed for this study is:

H3: There is a significant positive relationship between campus environmental hygiene and hygiene practices among university students in UTAR.

2.4.4 Peer Influence and Poor Hygiene Practices among University Students

Besides, peer influence has also been found to significantly affect hygiene-related behaviours among university students. Peer influence refers to the extent to which students' behaviours are shaped by the expectations and practices of their friends, classmates, and peer networks. When students perceive that peers prioritize hygiene, such as regular handwashing or maintaining clean surroundings, they are more likely to follow suit (Barrett & Cheung, 2021).

This effect has been confirmed in higher-education settings and related contexts. For example, a 2025 study involving Australian undergraduate nursing students found that peer influence significantly influenced the adherence to proper handwashing, even among those with lower individual motivation or environmental support (Fudolig et al., 2025b). Similarly, a 2025 *Frontiers in Public Health* survey during the COVID-19 pandemic identified peer discussions and social influence as key determinants of hygienic behaviour among students, reinforcing the role of social and normative factors in shaping compliance (Bolatova et al., 2025).

Earlier evidence from Southeast Asia also reinforces this point. A 2021 study in Indonesia emphasized the importance of social norms related to how friends and significant others engaged in hand hygiene. The findings revealed that students who believed their peers valued cleanliness were more likely to adopt hand hygiene as part of their own daily routines, suggesting similar mechanisms likely operate

across other university peer groups (Dwipayanti et al., 2021b). This is consistent with the principles of Social Norms Theory, which shows that perceived peer behaviours are often more influential than individual knowledge in determining whether students maintain proper hygiene practices.

In addition to social norms, theoretical perspectives such as behavioural contagion offer a deeper understanding of how hygiene behaviours propagate through peer networks. Social contagion refers to the tendency for behaviours to spread implicitly through social ties as individuals unconsciously adopt behaviours that are modelled by others in their peer group (King & Mendoza, 2021). In an educational context, Shin (2022) demonstrated this mechanism with academic behaviours: using longitudinal social network analysis, she showed that students' own academic engagement became significantly more aligned with that of both their close friends and admired peers—strong evidence of behavioural contagion in real-world student interactions (Shin, 2022). Collectively, these findings demonstrate that peer influence, whether through social norms, peer discussions, or unconscious behavioural imitation plays a crucial role in shaping hygiene practices among university students.

Therefore, the fourth hypothesis developed for this study is:

H4: There is a significant positive relationship between peer influence and hygiene practices among university students in UTAR.

2.5 Conclusion

The review of literature on the independent variables (knowledge towards hygiene practices, attitude towards hygiene practices, campus environmental hygiene and peer influence) and dependent variable (poor hygiene practices) are provided in this

chapter. Besides, the theoretical frameworks used in previous studies are also explained. Moreover, the conceptual framework and the hypotheses for this study are developed.

CHAPTER 3: RESEARCH METHODOLOGY

3.0 Introduction

The key purpose of this study is to determine the poor hygiene practices among university students in UTAR and the factors that affect the increase of hygiene-related disease. To complete this objective, research methodology, which is explained throughout this chapter, is very crucial. The research design is firstly addressed. Then, the data collection method is described. Subsequently, the sampling design, research tool, scales and definitions are discussed. Furthermore, the types of data processing and data analysis employed are explained. The quantitative study design has been used in this study. To collect the primary data for this study, online questionnaires are being used, and samples are drawn by using a quota sampling method.

3.1 Research Design

Research design is the plan or framework that integrates a study's components which are data collection, measurement, and analysis to address the research problem and test hypotheses. It specifies how evidence will be gathered and analysed (Slater & Hasson, 2025).

There are two broad variations of designs: qualitative and quantitative. Quantitative research relies on numerical measurement of variables and the statistical analysis of those measurements, emphasizing objectivity, standardization, and replicability (Creswell & Creswell, 2023).

Given our aim to examine factors associated with the increase of hygiene-related diseases among university students, a quantitative, cross-sectional survey is appropriate and consistent with recent student-health studies on hygiene and communicable-disease risks (Mohamed et al., 2024c). As Williams (2021) stated, quantitative research is objective and scientific, it is used to obtain outstanding knowledge and empathetic of the social world. It is always approved for its capability to transfer a more clarified and determinable outcomes.

3.2 Data Collection

One of the essential steps in every study is to gather data. In the end, the level of accuracy of the data collected will influence the aftermath of the results. There are many possible data sources, including primary and secondary data, for answering a research question (Totten et al., 2020). In this study, the primary data is chosen to collect the data to achieve the research objective.

3.2.1 Primary data

Primary data are collected for the first time by the researcher for the specific purpose of the study, making them original and tailored to the research problem (Ajayi, 2023). In this study, data will be gathered using self-administered questionnaires distributed to university students to assess factors influencing hygiene-related diseases. Questionnaires are highly suitable for this purpose because they allow standardized data collection (every respondent answers the same questions), are cost-effective, and can be administered efficiently especially online, which makes them both time-saving and scalable (Kuphanga, 2024). Additionally,

their anonymity promotes truthful answers, especially when discussing delicate health issues, improving the integrity of the data (Koo & Yang, 2025a). By removing the expenses of travel and printing, online distribution may also make it possible to collect large amounts of data from geographically scattered student populations in an efficient manner (Koo & Yang, 2025a). These features help ensure consistency, reduce interviewer bias, and facilitate robust quantitative analysis.

3.3 Sampling Design

3.3.1 Target Population

All respondents that fit the specific criteria, particularly for a research study, are included in the target population (Willie, 2024). To collect and analyse accurate data, it is the researchers' responsibility to ensure that the respondents are from the target demographic. Stated differently, it is critical to verify that the survey participants are eligible.

The objective of this study is to investigate the factors that affect the increase of hygiene-related diseases among university students. Therefore, the target population of this study are all students in Universiti Tunku Abdul Rahman (UTAR) Kampar Campus.

3.3.2 Sampling Location

The area that has been decided to gather the data is the sampling location. Since the target population are all university students in UTAR Kampar Campus, the sampling location chosen is UTAR Kampar Campus.

3.3.3 Sampling Elements

Every single unit or case of a target population is referred to as an element. Certain elements from the population will be selected for analysis in a study by using a certain sampling technique. In this study, the sampling elements or target respondents are all UTAR students from the Kampar campus, covering every faculty. The sample is drawn using quota sampling to ensure representation across key characteristics. Apart from faculty differences, respondents are also diverse in terms of gender, age range, ethnicity, and current year of study. This helps ensure the sample reflects the diversity of the student body, thereby improving representativeness across key demographic dimensions (Wild et al., 2022).

3.3.4 Sampling Technique

Two main sampling methodologies are recognized in quantitative research: probability sampling, where every member of the study population has an equal chance of being selected, and non-probability sampling, where selection is non-random and may introduce bias (Spolarich, 2023). For a study examining factors influencing the rise of hygiene-related diseases among all UTAR students,

probability sampling is essential as it enhances representativeness and supports unbiased inference across the entire student body.

Among the various probability sampling methods, simple random sampling is selected for this research. This technique ensures equitable selection by giving each student in the UTAR population the same opportunity to be chosen, thereby strengthening both internal and external validity (Makwana et al., 2023). A pertinent example is a postgraduate-level study at Universiti Putra Malaysia, where researchers employed simple random sampling to recruit participants for examining knowledge, attitudes, and practices related to food poisoning and its determinants among students (Mshelia et al., 2022).

By employing simple random sampling, the study ensures fair and unbiased selection of UTAR students, which enhances the reliability of data on key determinants such as peer influence, campus environmental hygiene, individual attitude and knowledge that may contribute to the prevalence of hygiene-related diseases.

3.3.5 Sampling Size

TABLE 1
Table for Determining Sample Size from a Given Population

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size.
S is sample size.

Figure 3.1. Table for Determination of Sample Size from a Given Population.
Adapted from Krejcie and Morgan (1970).

According to Krejcie and Morgan (1970), they asserted that a formula for calculating sample size was published by the research division of the National Education Association. To make sure that it is an appropriate decision model, they presented a table for choosing the sample size. The “Table for Determining Sample Size from a Given Population” is applied to decide the sampling size. According to the Introduction of the Universiti Tunku Abdul Rahman (UTAR) official webpage, the population of university students among UTAR has up to 20,000 students. Therefore, this study requires 377 minimum respondents.

3.4 Research Instrument

3.4.1 Questionnaire

The research instrument adopted to collect the primary data from the university students in UTAR Kampar is the questionnaire. According to Raisi et al. (2024), the best method for gathering data is a questionnaire, particularly for major populations. It is a tool that cost in low and highly effective method for obtaining a numerical assessment of a product's user experience (Schrepp et al., 2017). The respondents have to select the closest option to one's own answer based on their experiences or understanding of those question items about hygiene since this study applies fixed-alternative questions in the questionnaire (Bougie & Sekaran, 2020). The questionnaire of this study is being allocated online and via word-of-mouth sharing with the use of Google Form.

The survey questionnaire for this study is made up of a cover layout and six sections. Section A is designed to gather target respondents' personal demographic details. This section includes five personal background questions, which are linked to

gender, age range, race, current year of study and faculty. Next, section B consists of 10 questions related to the dependent variable – hygiene practices. While Section C to F comprises a total of 32 questions that covers all the factors (knowledge of hygiene, attitude on hygiene, campus environmental hygiene and peer influence) affecting the increase of hygiene related disease among university students.

In section B to F, all questions set up are evaluated by five-point Likert scales. De Koning et al. (2021) mentioned that by preventing the increase in survey production, this type of scale can help avoid survey fatigue, which is a phenomenon marked by lower response rates. Therefore, a lists design choices may directly prevent the decrease on data quality and reduce the respondent burden (De Koning et al., 2021). Survey participants are asked to score how much they agree with the claims, from strongly disagree (1) to strongly agree (5). They will also be asked to choose the frequent level according to the questions, from never (1) to always (5). Just alike with Ye et al. (2024), they used a five-point Likert scale ranging from ‘Strongly agree’ (5 points) to ‘Strongly disagree’ (1 point) to assess the attitude dimension contained of 8 questions on the study of knowledge, attitude, and practice of dental patients toward dental defects and dental fillings.

3.4.2 Pre-Test

Prior to sharing the questionnaire to the university students in UTAR Kampar Campus, the questionnaire has been checked by one Universiti Tunku Abdul Rahman’s lecturer.

3.4.3 Pilot Test

From recruitment and sampling tactics to data collection and analysis, pilot test evaluates the viability of the complete survey process, while pretesting is more focused on improving the questionnaire. In order to reduce the possibility of measurement error, a pilot test, which is typically carried out with a small sample group of people, can assist in providing answers to questions regarding the structure and content of the questionnaire (Wardropper et al., 2021). By conducting a pilot test, it may also reduce the number of items in the questionnaire to a suitable number, statistical analysis and suggesting comments may be collected too after the distribution (Wadood et al., 2021). Therefore, a pilot test is performed before moving on to the proper data collection process. Relying on the pilot test's results, the instrument can be regarded as valid and trustworthy while also providing space for improvements and changes to the questionnaire (Gani et al., 2020).

The pilot test in this study will be carried out during the second Research Project, right before the proper data collecting session. A total of 50 sets of questionnaire forms will be distributed to the university students from different faculties, including CFS, FAS, THP FBF, FSc, FEGT, FICT, ICS and IPSR in Kampar Campus. Bujang et al. (2024) have suggested a minimum requirement of a sample size of 50 respondents specifically to test the reliability of a questionnaire. The cafeteria and the bustling corridors among the campus had become the target location to gather prime data from the university students. After that, all the data collected were processed through the SPSS 30.0 software to review and measure the questionnaires' validity and reliability.

3.5 Constructs Measurement (Scale and Operational Definitions)

Construct measurement is a significant process for every researcher attempting to develop an operational study or theoretical contribution (Meglio, 2020). In this study, construct management is important to control the validity of the findings and outcomes.

3.5.1 Scale of Measurement

Measurement refers to the systematic assignment of symbols, such as numbers to attributes of a variable according to predefined rules. In research, this allows complex characteristics to be quantified and analysed. Variables are classified using different measurement scales which are nominal, ordinal, and interval, each defining how data can be ordered, compared, and analysed. By applying these scales, researchers translate abstract variables into measurable data so that statistical techniques can be applied appropriately (Shukla, 2023).

3.5.1.1 Nominal Scale

A nominal scale enables researchers to classify subjects into distinct, mutually exclusive groups without any implied ranking. In this method, values act as labels to categorize data, with no inherent quantitative meaning assigned to them (Statology, 2023). Importantly, such classification doesn't imply order or magnitude; rather, it simply groups subjects for analytic purposes. This scale is particularly suitable for variables like gender, where responses are categorized (e.g., male, female) but cannot be ordered or compared numerically (Britannica, 2025). In this study, the nominal scale is employed in Section A to categorize respondents by gender, faculty, and ethnicity.

Example of nominal scale:

Your gender:	
☐ Male	☐ Female

3.5.1.2 Ordinal Scale

An ordinal scale not only groups data into categories but also orders them, reflecting relative ranking. However, it lacks the precision of interval measurement specifically, it doesn't indicate the distance between ranks, making it impossible to gauge how much higher one category is over another (Sideridis, 2023). In this study, the ordinal scale is used in Section A to capture respondents' age groups, where categories such as "below 18," "18 – 20," "21 – 23," "24 – 26," and "26 and above" indicate progression but don't imply equal spacing between them. Recognizing this distinction ensures that we apply appropriate analytical methods later in the research process.

Example of ordinal scale:

Your age:				
☐ < 18	☐ 18 - 20	☐ 21 - 23	☐ 24 - 26	☐ > 26

3.5.1.3 Interval Scale

Although a Likert-type scale is technically ordinal, it is often treated as an interval scale in practice because it allows researchers to quantify attitudes by assigning numerical values (e.g., 1 – 5) that imply meaningful, equal spacing between response options. This scale combines the category distinctions of nominal and ordinal levels with the numeric comparability of interval measures, enabling more nuanced statistical analysis (Koo & Yang, 2025b). In this study, such interval-level measurement is employed from Section B through Section F to assess both independent and dependent variables using Likert-type items.

Example of interval scale:

	Never	Occasionally	Sometimes	Often	Always
Do you wash your hands before eating in the cafeteria?	1	2	3	4	5

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I understand the importance of soap for hand washing	1	2	3	4	5

3.5.2 Origin of Construct

Table 3.1:

Summary of Measures Used for Present Study

Variables	Adapted from	Items	Scale
Dependent Variable: Hygiene Practices	Qasem et al. (2018)	2 items	Never (1) to Always (5)
	Corbo et al. (2024)	1 item	
	Singh et al. (2023)	3 items	
	Ali et al. (2022)	4 items	
Independent Variable 1: Knowledge of Hygiene	Alaba (2021)	1 item	Strongly disagree (1) to Strongly agree (5)
	Nurudeen and Toyin (2020)	1 item	
	Patel et al. (2025)	4 items	
	Ali et al. (2022)	2 items	
Independent Variable 2: Attitude on Hygiene	Mansour and Alfojery (2025)	5 items	Strongly disagree (1) to Strongly agree (5)
	Alaba (2021)	1 item	
	Bulut and Özgüler (2022)	1 item	
	Nurudeen and Toyin (2020)	1 item	
Independent Variable 3: Campus Environmental Hygiene	Qasem et al. (2018)	3 items	Never (1) to Always (5)
	Fitria et al. (2018)	6 items	
	Ali et al. (2022)	1 item	
Independent Variable 4: Peer Influence	Saadu (2022)	3 items	Never (1) to Always (5)
	Amon-Tanoh et al. (2022)	3 items	

3.5.3 Measurement of Independent Variables and Dependent Variable: Operational Definition

Four factors affecting the increase of hygiene-related diseases among university students are chosen in this study, which are knowledge of hygiene, attitude on hygiene, campus environmental hygiene and peer influence. The five-point Likert scale is applied for all the items of the factors. There are two types of scale being used. First is one means “Never” and five means “Always” to evaluate the frequency of the respondents. While the second is one means “Strongly Disagree” and five means “Strongly Agree” to determine their agreement.

3.5.3.1 Hygiene Practices

Hygiene practices refer to procedure that can promote cleanliness and good health such as regular hand washing, face washing, and taking a bath with soap and water (Tadvi et al., 2024).

Hygiene practices are measured by 10 items that are adopted from Ali et al. (2022) and Singh et al. (2018). Some sample items are “Do you sneeze or touch your mouth and nose while working with food”, “Do you save your food from flies?”, “Do you touch food and money at the same time?” and “Do you dispose of the food waste properly?”.

3.5.3.2 Knowledge of Hygiene

Nair et al. (2014) had interrelated mentioned about the knowledge of hygiene, refers to the awareness of individuals towards the actions should keeping themselves and their area around clean to maintain the cleanliness and promote a good health.

Knowledge of hygiene practices is determined by 8 items. The scale is embraced from Patel et al. (2025) and Ali et al. (2022). Some of the sample items are “Understand the importance of soap for handwashing”, “Know how to wash hands properly”, “Believe in maintaining toilet cleanliness” and “Believe handwashing prevents illness”.

3.5.3.3 Attitude on Hygiene

Attitude towards hygiene practices refers to how positively or negatively individuals evaluate the importance of maintaining personal and environmental cleanliness to prevent the spread of diseases (Patel et al., 2025).

Attitude towards hygiene practices is measured by employing 8 items which are adopted from Nurudeen and Toyin (2020b) and Mansour and Alfojery (2025). Some sample items are “I wash my hands with soap and water before and after meals.”, “I like to see cleanliness at home, school, on the street, and everywhere.”, “I have never attended any school workshops to raise awareness about chronic and infectious diseases, their causes, and prevention methods.”, “I don’t cover my nose and mouth with a tissue when sneezing or coughing.” and “I use my teeth to cut things and open containers.”.

3.5.3.4 Campus Environmental Hygiene

Campus environmental hygiene relates to cleanliness and sanitation among university areas, which include daily care on waste disposal, maintenance of green and built areas, safe water supply and toilets (Jamian et al., 2018; Agbonifoh & Erhabor, 2021).

Campus environmental hygiene is evaluated by 10 items, which selected from Qasem et al. (2018b) and Fitria et al. (2018). Some sample items are “Is a trash can provided in every room where trash is created?”, “Do the trash cans use an appropriate design and materials, so that they do not leak, are waterproof, and have a cover?”, “Does the cafeteria provide water for washing hands?”, “Does the cafeteria provide soap and a dryer for washing hands?” and “Does the cafeteria provide protection from mice and bugs?”.

3.5.3.5 Peer Influence

Peer influence towards hygiene practices refers to the extent to which individuals’ hygiene-related behaviours are shaped by the expectations and behaviours of those around them, including family, friends, and community members. Social norms, such as perceived importance of handwashing or whether others are observed engaging in it, strongly affect personal hygiene practices (Amon-Tanoh et al., 2022).

Peer influence is measured by using 6 items. These items are adapted from Saadu (2022). Sample items include “Pupils learn to cooperate in group settings and group games”, “Communicating in class” and “Enjoy group activities and group games that focus on a common interest”.

3.5.4 Questionnaires Designing

The questionnaires contain six parts which are Section A, B, C, D, E and F. Section A is associated with demographic variables. Hence, the personal information of targeted respondents is collected in this section. There is a sum of five questions in Section A. Gender, ethnicity, and faculty are measured by the nominal scale, whereas age and year of study are measured by the ordinal scale.

In Section B, there are ten questions for the dependent variable, which is the hygiene practices. The Likert scale, which is an interval scale, was utilized as the scale of measurement. The respondents need to choose from the range from 1 to 5 to show their perception. In the questionnaire, 1 indicates “Never”, 2 indicates “Occasionally”, 3 indicates “Sometimes”, 4 indicates “Often” and 5 indicates “Always”.

Section C consists of questions on knowledge of hygiene. There are eight questions designed to assess students’ awareness and understanding of hygiene, such as the importance of soap, proper handwashing steps, and the link between hygiene and illness prevention. This section employs an interval scale using a five-point Likert scale, where 1 = “Strongly Disagree” and 5 = “Strongly Agree”.

Section D addresses students’ attitudes toward hygiene. A total of eight items is included, asking respondents about their sense of responsibility and behaviour, such as washing hands before eating or covering their mouth when sneezing. Similar to Section C, the questions use a five-point Likert scale from “Strongly Disagree” to “Strongly Agree”.

Section E focuses on campus environmental hygiene. Ten items are included to evaluate the hygiene conditions of the campus environment, such as the availability of soap in restrooms, hand sanitizers in classrooms, and cleanliness of the cafeteria. Responses are measured using a five-point frequency scale (1 = “Never” to 5 = “Always”).

Section F consists of six questions about peer influence on hygiene. This section evaluates how peers and group settings influence personal hygiene practices, such as discussing hygiene in class or observing handwashing habits among others. A five-point frequency Likert scale is used, ranging from “Never” to “Always”.

After collecting the responses, the data will be analyzed using SPSS version 30.0 to test the reliability of the questionnaire and assess the relationships among variables.

3.6 Data Processing

Data processing is the systematic procedure of transforming raw data into meaningful information for analysis. It involves several critical stages such as validation, editing or cleansing, coding, and transcription, all of which ensure that collected responses are accurate, consistent, and ready for statistical testing. Careful attention during these steps is essential to minimize errors and maintain data integrity. Once the raw data has been processed, it becomes suitable for analysis and interpretation (Infomineo, 2025). In this study, the processed data will be analyzed using SPSS version 30.0, which enables reliability testing and statistical examination of the findings.

3.6.1 Data Checking

Conducting data checking is an essential first step after data collection, help to ensure that survey responses are valid and reliable. This process addresses issues like incomplete responses, skipped items, or inconsistent answers, often identified through a pilot test, which enables early detection and correction of such problems, thereby enhancing the instrument's reliability. It is the responsibility of researchers to ensure that the data provided by respondents is both complete and accurate, safeguarding data quality (Chaudhuri & Agiwal, 2024). In essence, data checking refines raw responses into trustworthy data for analysis.

3.6.2 Data Editing

Following data checking, the next critical phase is data editing, where researchers review and correct incomplete or inconsistent responses to improve dataset quality. This process involves identifying missing or problematic responses and, when appropriate, inputting plausible values based on observed response patterns, often through methods like simple imputation or, ideally, more advanced techniques to maintain consistency and integrity across the dataset. By doing so, editing serves to reduce unreliable or unusable data, ultimately leading to more robust analytical outcomes (Afkanpour et al., 2024).

3.6.3 Data Coding

Next, data coding translates respondents' answers into numerical form, typically assigning values like 1 – 5 to Likert-type responses, while reserving a specific code

(e.g., 99) for missing data, and prepares the data for software analysis such as SPSS 30.0. This systematic conversion standardizes responses and allows statistical software to interpret and analyze the dataset effectively. Ensuring such consistency in coding also helps reduce ambiguity and supports accurate analysis outcomes (Seidenberg et al., 2023).

Q1	Gender	“Male” = 1 “Female” = 2
Q2	Age	“<18” = 1 “18-20” = 2 “21-23” = 3 “24-26” = 4 “>26” = 5
Q3	Ethnicity	“Malay” = 1 “Indian” = 2 “Chinese” = 3
Q4	Current year of study	“Year 1” = 1 “Year 2” = 2 “Year 3” = 3 “Year 4” = 4
Q5	Faculty	“Center of Foundation Studies (CFS)” = 1 “Faculty of Art and Social Science (FAS)” = 2 “The Hong Piow Faculty of Business and Finance (THPFBF)” = 3 “Faculty of Science (FSc)” = 4 “Faculty of Engineering and Green Technology (FEGT)” = 5 “Faculty of Information and Communication Technology (FICT)” = 6 “Institute of Chinese Studies (ICS)” = 7 “Institute of Postgraduate Studies and Research (IPSR)” = 8

In Section B, E and F, the answer to each question is coded with the five-point Likert scale as below:

- “Never (N)” is coded as 1
- “Occasionally (O)” is coded as 2
- “Sometimes (S)” is coded as 3
- “Often (O)” is coded as 4
- “Always (A)” is coded as 5

In Section C and D, the answer to each question is coded with the five-point Likert scale as below:

- “Strongly Disagree (SD)” is coded as 1
- “Disagree (D)” is coded as 2
- “Neutral (N)” is coded as 3
- “Agree (A)” is coded as 4
- “Strongly Agree (SA)” is coded as 5

3.6.4 Data Transcribing

Finally, data transcription is carried out, where raw responses are converted into organized and usable information. This step ensures that the collected data is properly structured for analysis. During the entire data processing stage, SPSS version 30.0 is utilized to support the transformation and statistical evaluation of the dataset.

3.7 Data Analysis

The data is tested to look to see whether the hypotheses established in this study are approved or denied after the data processing (Bougie & Sekaran, 2020). This procedure assists in addressing the suggested research questions (Bougie & Sekaran, 2020). The data is analyzed by adopting the statistical software SPSS 30.0. Sherfudeen (2025) has suggested using the software SPSS on quantitative analysis. This software is adopted for operating varied data analyses, namely descriptive analysis, reliability test, multicollinearity test, normality test and inferential analysis.

3.7.1 Descriptive Analysis

Descriptive analysis is a constructive and helpful method to make the data easier, and also, downsizing the complication of the data (Hayes, 2024). The mean, median, mode, variance, standard deviation, and other statistical measures of central tendency and dispersion were employed as statistical tools in this analysis (Yaska & Nuhu, 2024). It commonly relies on visual appliances like graphs and tables. In order to obtain a fast and straightforward look at the participants' demographics and general responses, pie charts are being used to investigate Section A of the questionnaire in this study.

3.7.2 Reliability Analysis

The dependability and consistency of a questionnaire's items over time can be identified with the help of reliability analysis. One of the most popular methods for

evaluating reliability is Cronbach's alpha, which illustrates how closely related the items are to one another. The closer the Cronbach's alpha value is to 1, the more reliable the items are (Yun et al., 2023). Therefore, Cronbach's alpha is widely used to evaluate the reliability of questionnaire items.

Analysis of alpha Likert-scale questions	
Cronbach's Alpha	Internal consistency
0.9 and above	Excellent
0.8 - 0.9	Good
0.7 - 0.8	Acceptable
0.6 - 0.7	Questionable
0.5 - 0.6	Poor
below 0.5	Unacceptable

Figure 3.2. Consistency level of Cronbach's alpha value. Adapted from Yun et al. (2023).

As shown in Figure 3.2, the scales have unacceptable reliability when the Cronbach's alpha value is below 0.5. Then, a Cronbach's alpha value with 0.5 – 0.6 has a poor consistency. Next, the scale remains questionable when the value of Cronbach's alpha is among 0.6 – 0.7. In addition, the scale becomes acceptable when the value is equal or greater than 0.7 but less than 0.8. Moreover, the Cronbach's alpha value that shows 0.8 – 0.9 considered as good consistency. Lastly, the scales granted excellent reliability when the value of Cronbach's alpha shows 0.9 and above. Thus, the Cronbach's alpha should be above 0.6 to guarantee the reliability of a scale.

3.7.3 Preliminary Data Screening

3.7.3.1 Multicollinearity

The first preliminary data screening that needs to be done is revealing multicollinearity. Multicollinearity is known as an analytical phenomenon that occurs when two or more independent variables in a regression model exhibit a strong linear relationship with one another (Bhandari, 2025). To assess whether multicollinearity is present, one commonly used diagnostic measure is the Variance Inflation Factor (VIF). The VIF quantifies how much the variance of a regression coefficient is “inflated” because of linear correlations among the predictors. A VIF value of 1 indicates no correlation between independent variables and other variables; values between 5 and 10 or sometimes a lower threshold like 4 or 5 are often considered moderate to high multicollinearity (Singh, 2024). Values beyond these thresholds suggest serious multicollinearity that may threaten the stability and interpretability of estimated coefficients (Fiveable, n.d.).

Based on Ellsworth et al. (2023a), coefficient estimates may become unstable when multicollinearity is severe, in which any small changes in data or model specification may causing to large swings in coefficient values or even changing their signs. This small change may include a tiny adding or removing predictors. Standard errors of coefficients are inflated, which means some hypothesis tests may fail to detect variables that truly have effects (Al-Essa et al., 2024a). Ultimately, this weakens our ability to draw reliable inferences about which independent variables matter and how much they matter.

3.7.3.2 Normality

A normality test determines whether the data used in the study has a normal distribution or if a data sample comes from a population that has a normal distribution (Editage, 2023). A few tests can be used to determine whether the data distribution is normal.

One method of visualising a normal distribution of the given variable is histogram, which plots the data on a graph. Editage (2023) states that when there is a small difference between the theoretical normal distribution curve and the actual sample distribution, the data is regarded as normal. On the other hand, a non-normal distribution indicates that the sample is not consistent.

Additionally, a QQ plot is also used to contrast the quantiles of the measured values with the theoretical quantiles that the data would have if it were completely normal. All the points would be on the line if the data were perfectly normally distributed. The data appears to be less normally distributed the further it deviates from the line (DATAtab Team, 2025).

Furthermore, it can use skewness and kurtosis to perform a normality test. To achieve a distribution that is normal, a skewness value of -1 to +1 is usually acceptable. The kurtosis of a normal distribution is represented by 3, which is often used to compare kurtosis values. If the software uses excess kurtosis, which deducts 3 from the raw kurtosis value, this can occasionally be set to 0 (Omega Graduate School, 2023).

3.7.4 Inferential Analysis

Inferential statistics is a part of statistics that uses probability models and sample data to make educated guesses, measure uncertainty, and test ideas about a whole group that can't be measured directly (Elkins et al., 2022). Instead of just describing what was seen, inferential methods like confidence-interval estimation, hypothesis testing, and regression modelling give formal ways to figure out population parameters and see if the patterns that were seen are likely to be real effects or random variation (Hand, 2021).

In this study, a multiple regression analysis is used in studying 377 university students of UTAR Kampar Campus. It helps to identify the relationship between the dependent variable, hygiene practices and the independent variables, knowledge of hygiene practices, attitudes on hygiene practices, campus environmental hygiene and peer influence.

3.7.4.1 Multiple Linear Regression Analysis

When a single dependent variable is impacted by several independent predictors, multiple linear regression is frequently employed to enable researchers to assess intricate relationships at the same time (Al-Essa et al., 2024b). This method was used in clinical modelling by Ellsworth et al. (2023b) and logistic regression contexts by Lukman et al. (2024), both of which showed that regression analysis can accurately evaluate the influence of several explanatory factors on a single outcome. These applications demonstrate that this approach is appropriate in situations where multiple independent variables are thought to have an impact on the dependent variable being studied.

After judging the regression model, a few statistical outputs are commonly inspected. For example, the model summary, ANOVA results, and coefficients table. The coefficient of determination, R^2 , is generally used to evaluate the explanatory power of independent variables on the dependent outcome (Al-Essa et al., 2024b). Besides, the ANOVA F-statistic provides proof of whether the regression model is significantly explains the variance in the outcome variable (Ellsworth et al., 2023b). Finally, the coefficients table may allow researchers to test if each independent variable significantly contributes to predicting the dependent variable or not. It is typically based on p-values or confidence intervals (Lukman et al., 2024).

The equation for the multiple linear regression is

$$HP_i = \beta_0 + \beta_1 KOHP_i + \beta_2 AOHP_i + \beta_3 CEH_i + \beta_4 PI_i + \mu_i$$

Where HP_i = Hygiene Practices

$KOHP_i$ = Knowledge of Hygiene Practices

$AOHP_i$ = Attitudes on Hygiene Practices

CEH_i = Campus Environmental Hygiene

PI_i = Peer Influence

μ_i = error term

3.8 Conclusion

This chapter describes the research design of this study, which uses quantitative research. The data collected by utilizing questionnaires is primary data. Moreover, the sampling technique selected for this research is simple random sampling. Besides, a minimum of 377 respondents is required to complete the questionnaires for this study. Meanwhile, pre-test and pilot test will be organized before the full-scale test. After gathering enough sample response, all the data testing will be operated through SPSS 30.0 software. Finally, data analyses will be the continuing step to be conducted.

CHAPTER 4: RESEARCH RESULTS

4.0 Introduction

Finally, the data analysis results are displayed in this chapter. First of all, the descriptive analysis will be started to provide an overview of the data collected. Next, a reliability test is conducted to determine whether the measurement scales used in the study are consistent and dependable. After that, a preliminary screening of the data will be organized to diagnose any problems such as multicollinearity or non-normality. Lastly, a multiple linear regression analysis is carried out to delve into the relationships between fundamental variables. All analyses were performed using SPSS version 30.0.

4.1 Descriptive Analysis

The analysis starts with descriptive statistics to support the data easier to understand. Firstly, Section A of the survey, which is about the respondents' demographic data, will be investigated. Next, the responses from Section B to Section F are also analyzed using descriptive methods. This part will be using tables and pie charts to summarize and visualize the information.

4.1.1 Respondents' Demographic Profile

This study consists of five categories of demographic data: gender, age range, race, current year of study and faculty. Each of them is analyzed individually in the sections that follow.

4.1.1.1 Gender

Table 4.1:

Descriptive Analysis for Gender

Gender		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Male	163	42.9	42.9	42.9
	Female	217	57.1	57.1	100.0
	Total	380	100.0	100.0	

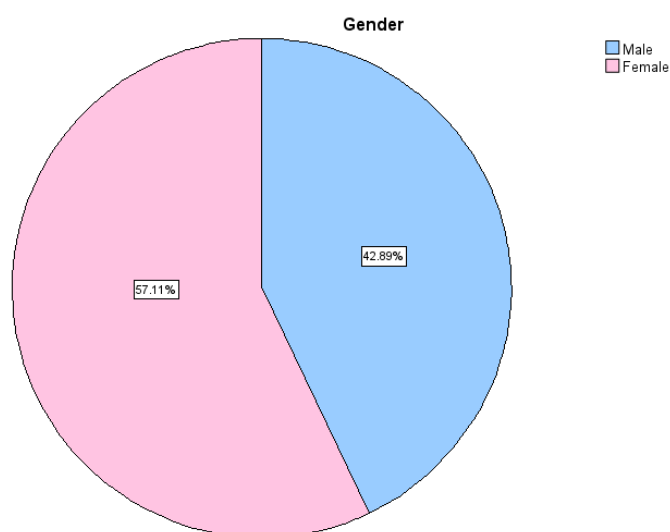


Figure 4.1. Descriptive Analysis for Gender.

The analysis begins by classifying the respondents based on their gender. A total of 380 UTAR students participated in the survey, as shown in Table 4.1. Then, Table 4.1 and Figure 4.1 show that 42.89% (163 respondents) of them are male while 57.11% (217 respondents) of them are female. Thus, there are more female participants divide from the male ones.

4.1.1.2 Age Range

Table 4.2:

Descriptive Analysis for Age Range

Age Range		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	<18	8	2.1	2.1	2.1
	18-20	156	41.1	41.1	43.2
	21-23	177	46.6	46.6	89.7
	24-26	31	8.2	8.2	97.9
	>26	8	2.1	2.1	100.0
	Total	380	100.0	100.0	

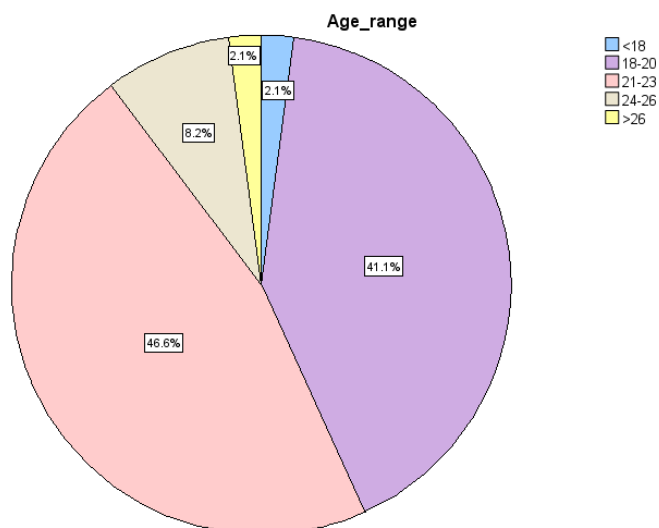


Figure 4.2. Descriptive Analysis for Age Range.

Besides gender, the respondents are also grouped according to the age range in which they belong to. Based on Table 4.2 and Figure 4.2, 41.1% (156 respondents) of the participants are from 18 to 20 years old. Next, 46.6% (177 respondents) of the participants are from 21 to 23 years old. Besides, only 8.2% (31 respondents) of the participants are from 24 to 26 years old. Lastly, there are two pieces of 2.1% (8 respondents each) of the participants are <18 years old and >26 years old.

4.1.1.3 Race

Table 4.3:

Descriptive Analysis for Race

Race		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Malay	18	4.7	4.7	4.7
	Indian	35	9.2	9.2	13.9
	Chinese	327	86.1	86.1	100.0

	Total	380	100.0	100.0	
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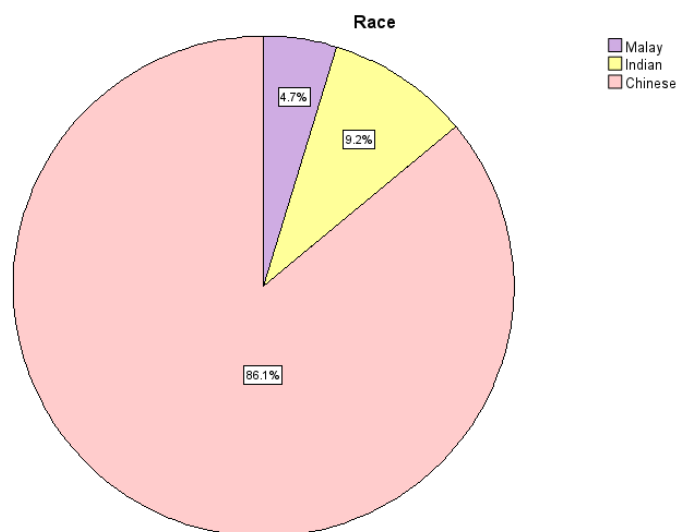


Figure 4.3. Descriptive Analysis for Race.

Next, the third category is race. Based on Table 4.3 and Figure 4.3, there are three types of races for the participants. Most of the respondents are Chinese because they clarify at 86.1% (327 respondents) of the total participants. 9.2% (35 respondents) of them are Indians. The least number of respondents are Malays since they only account for 4.7% (18 respondents).

4.1.1.4 Current Year of Study

Table 4.4:

Descriptive Analysis for Current Year of Study

Current Year of Study		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	Year 1	151	39.7	39.7	39.7

	Year 2	87	22.9	22.9	62.6
	Year 3	107	28.2	28.2	90.8
	Year 4	35	9.2	9.2	100.0
	Total	380	100.0	100.0	

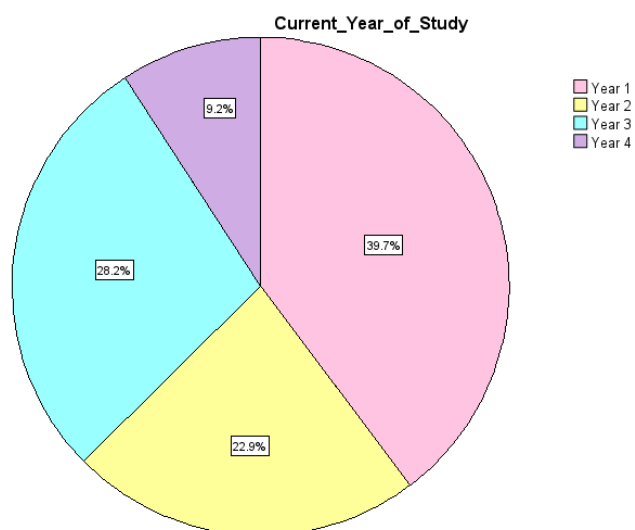


Figure 4.4. Descriptive Analysis for Current Year of Study.

Continue with the category: current year of study. According to Table 4.4 and Figure 4.4, 39.7% (151 respondents) of the participants are Year 1 students. Next, 22.9% (87 respondents) of them are Year 2 students. 28.2% (107 respondents) of the participants are Year 3 students. The least number of respondents are Year 4 students as they only counted for 9.2% (35 respondents) of the total 380 of them.

4.1.1.5 Faculty

Table 4.5:

Descriptive Analysis for Faculty

Faculty		Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Valid	CFS	53	13.9	13.9	13.9
	FAS	51	13.4	13.4	27.4
	THP FBF	157	41.3	41.3	68.7
	FSc	40	10.5	10.5	79.2
	FEGT	23	6.1	6.1	85.3
	FICT	41	10.8	10.8	96.1
	ICS	13	3.4	3.4	99.5
	IPSR	2	0.5	0.5	100.0
	Total	380	100.0	100.0	

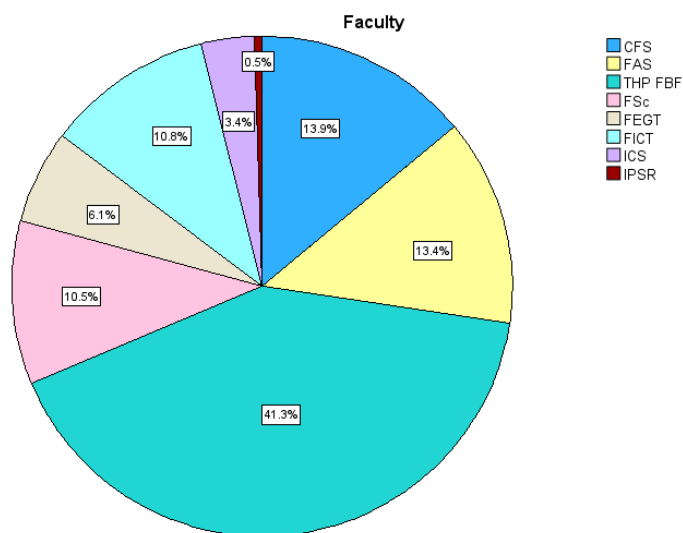


Figure 4.5. Descriptive Analysis for Faculty.

Lastly, the respondents are also grouped by their faculties. According to Table 4.5 and Figure 4.5, most respondents, which are 41.3% (157 respondents), are from the Teh Hong Piow Faculty of Business and Finance (THP FBF). Then, 13.9% (53 respondents) identified from Centre of Foundation Studies (CFS). Next, 13.4% (51 respondents) are from Faculty of Arts and Social Science (FAS). Moreover, there are 10.5% (40 respondents) from Faculty of Science (FSc). 6.1% (23 respondents) are from Faculty of Engineering and Green Technology (FEGT). Furthermore, 10.8% (41 respondents) are from Faculty of Information and Communication Technology (FICT). There are 3.4% (13 respondents) are from Institute of Chinese Studies (ICS). The least group come from Institute of Postgraduate Studies and Research (IPSR) since there are only 0.5% (2 respondents) of them from this faculty.

4.1.2 Central Tendencies and Dispersion Measurement of Constructs

For the next part, the responses for the questions related to the dependent variable and the independent variables collected in Section B to Section F are investigated. The analyses conducted contain one of the measures of central tendencies, which is the mean, and one of the measures of dispersion, which is the standard deviation. The analysis is done individually for each variable.

4.1.2.1 Hygiene Practices

Table 4.6:

Central Tendencies Measurement of Hygiene Practices

Question	Statement	Sample Size, N	Mean	Standard Deviation	Mean Ranking	Standard Deviation Ranking
HP1	Do you wash your hands with water and soap before and after using the restroom?	380	4.17	1.035	3	8
HP2	Do you usually use alcohol-based products for hand hygiene?	380	3.20	1.161	8	4
HP3	Do you use paper towels to dry your hands in and out of college?	380	3.46	1.269	7	3
HP4	Do you wash your hands before eating in the cafeteria?	380	3.94	1.125	6	5
HP5	Do you sneeze or touch your mouth and nose while eating in the cafeteria?	380	2.85	1.357	9	2

HP6	Do you wash your hands after wiping or blowing your nose in the classroom?	380	3.98	1.106	5	6
HP7	Do you wash your hands after touching stary animals or plants on campus?	380	4.36	0.960	2	9
HP8	Do you chase away the flies from your food in the university canteen?	380	4.42	0.914	1	10
HP9	Do you touch food and money at the same time when you pay at the university canteen?	380	2.53	1.362	10	1
HP10	Do you dispose of the food waste properly in the university canteen?	380	4.15	1.067	4	7

First, the questions related to hygiene practices are examined. According to table 4.6, HP8 has the largest mean of 4.42. It also has the smallest standard deviation of 0.914. The second-largest mean of 4.36 belongs to HP7, with a standard deviation of 0.960. Next, the third-largest mean is 4.17 for HP1, and it has a standard deviation

of 1.035. Thereafter, HP10 obtains the fourth-largest mean of 4.15 with a standard deviation of 1.067, while HP6 has the fifth-largest mean of 3.98 and a standard deviation of 1.106. Then, HP4 records the sixth-largest mean of 3.94 with a standard deviation of 1.125. In addition, HP3 has the seventh-largest mean of 3.46 with a standard deviation of 1.269, followed by HP2 with the eighth-largest mean of 3.20 and a standard deviation of 1.161. HP5 obtains the ninth-largest mean of 2.85 with a standard deviation of 1.357. Lastly, HP9 has the smallest mean of 2.53, and it also shows the largest standard deviation of 1.362.

4.1.2.2 Knowledge of Hygiene

Table 4.7:

Central Tendencies Measurement of Knowledge of Hygiene

Question	Statement	Sample Size, N	Mean	Standard Deviation	Mean Ranking	Standard Deviation Ranking
KOH1	Washing my hands after using toilets is good hygiene practice.	380	4.55	0.910	2	5
KOH2	Washing my hands before and after eating is good hygiene practice.	380	4.44	0.974	6	3
KOH3	I understand the importance of	380	4.48	0.897	4	6

	soap for hand washing.					
KOH4	I understand the steps to wash hands properly.	380	4.19	0.950	7	4
KOH5	I understand hand washing may prevent illness.	380	4.47	0.891	5	7
KOH6	I understand the importance of maintaining toilet cleanliness in the university.	380	4.57	0.805	1	8
KOH7	I understand unhygienic conditions can cause harmful disease.	380	4.42	0.997	3	2
KOH8	Smoking should be allowed in the area of the canteen.	380	2.18	1.592	8	1

Secondly, questions relating to knowledge of hygiene are investigated. According to table 4.7, KOH6 has the largest mean of 4.57. However, it has a standard deviation of 0.805. The second-largest mean of 4.55 belongs to KOH1 and it has a standard deviation of 0.910. Then, the third-largest mean which is 4.48, belongs to KOH3 with a standard deviation of 0.897. Additionally, KOH5 records the fourth-largest mean of 4.47 and it has a standard deviation of 0.891, while KOH2 has the fifth-largest mean of 4.44 with a standard deviation of 0.974. Next, KOH7 obtains the sixth-largest mean of 4.42 and a standard deviation of 0.997. Moreover, KOH4

has the seventh-largest mean of 4.19 with a standard deviation of 0.950. Lastly, KOH8 obtains the smallest mean which is 2.18 and it also has the largest standard deviation of 1.592.

4.1.2.3 Attitudes on Hygiene

Table 4.8:

Central Tendencies Measurement of Attitudes on Hygiene

Question	Statement	Sample Size, N	Mean	Standard Deviation	Mean Ranking	Standard Deviation Ranking
AOH1	I should wash my hands before and after eating in the cafeteria.	380	4.38	0.936	2	8
AOH2	It is not always possible to wash one's hand before eating in the cafeteria.	380	3.21	1.263	6	3
AOH3	I should wash my hands with soap after the toilet.	380	4.34	0.943	3	7
AOH4	I may forget to wash my hands after the toilet.	380	2.16	1.447	8	2
AOH5	I should cover my nose and mouth with a tissue when	380	4.32	1.031	4	5

	sneezing or coughing in the classrooms/lecture halls.					
AOH6	I will use my teeth to cut things and open containers without any tools in the campus area.	380	2.48	1.450	7	1
AOH7	I have never attended any school workshops to raise awareness about chronic and infectious diseases, their causes, and prevention methods.	380	3.44	1.260	5	4
AOH8	I like to see the cleanliness at the university campus area.	380	4.46	0.970	1	6

Subsequently, the questions related to attitude on hygiene are analysed. According to the table 4.8, AOH8 has the largest mean of 4.46. However, it has a standard deviation of 0.970. The second-largest mean of 4.38 belongs to AOH1 and it has a standard deviation of 0.936. Then, the third-largest mean which is 4.34 belongs to AOH3 with a standard deviation of 0.943. Next, AOH5 records the fourth-largest mean of 4.32 and it has a standard deviation of 1.031, while AOH7 has the fifth-largest mean of 3.44 with a standard deviation of 1.260. Following that, AOH2 obtains the sixth-largest mean of 3.21 and a standard deviation of 1.263. Also,

AOH6 has the seventh-largest mean of 2.48 with a standard deviation of 1.450. Lastly, AOH4 records the eighth-largest mean of 2.16 and it also has a standard deviation of 1.447.

4.1.2.4 Campus Environmental Hygiene

Table 4.9:

Central Tendencies Measurement of Campus Environmental Hygiene

Question	Statement	Sample Size, N	Mean	Standard Deviation	Mean Ranking	Standard Deviation Ranking
CEH1	Does soap available in the restrooms of the university?	380	3.92	1.029	2	8
CEH2	Does the hand dryer machine provide in the restrooms of the university?	380	2.55	1.489	10	1
CEH3	Do sanitizers be distributed in laboratories, classrooms, corridors, and restrooms of the university?	380	3.58	1.154	6	3
CEH4	Does a trash bin provide	380	4.15	0.952	1	10

	everywhere in the campus where trash is created?					
CEH5	Does the trash bin use an appropriate design and materials, so that they do not leak, are waterproof and have a cover?	380	3.90	1.026	3	9
CEH6	Does the cafeteria provide water and soap for washing hands?	380	3.84	1.067	5	6
CEH7	Are basins for hands and utensils washing separated in the cafeteria?	380	3.85	1.097	4	5
CEH8	Does the cafeteria have sealed storage?	380	3.54	1.033	7	7
CEH9	Does the cafeteria clean with no trash?	380	3.35	1.123	8	4
CEH10	Does the cafeteria provide protection from	380	2.96	1.336	9	2

	mice, bugs and birds?					
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In addition, the questions related to campus environmental hygiene are examined. Based on the table 4.9, CEH4 records the highest mean of 4.15, with a standard deviation of 0.952. The second-highest mean is observed for CEH1 at 3.92, and it has a standard deviation of 1.029. This is followed by CEH5, which has a mean of 3.90 and a standard deviation of 1.026. Subsequently, CEH7 shows the fourth-highest mean of 3.85 with a standard deviation of 1.097, while CEH6 reports the fifth-highest mean of 3.84 and a standard deviation of 1.067. In comparison, CEH3 has a mean of 3.58 and a standard deviation of 1.154, placing it sixth in the ranking. Moreover, CEH8 records the seventh-highest mean of 3.54 with a standard deviation of 1.033, followed by CEH9 with a mean of 3.35 and a standard deviation of 1.123. CEH10, on the other hand, has a lower mean of 2.96 and a standard deviation of 1.336, ranking ninth. Finally, CEH2 reports the lowest mean of 2.55 and shows the highest standard deviation of 1.489, indicating greater variability in responses.

4.1.2.5 Peer Influence

Table 4.10:

Central Tendencies Measurement of Peer Influence

Question	Statement	Sample Size, N	Mean	Standard Deviation	Mean Ranking	Standard Deviation Ranking
PI1	Do you learn to cooperate in group settings and group	380	3.46	1.144	4	3

	discussions about hygiene?					
PI2	Do you communicate about hygiene topics in the class?	380	3.27	1.180	5	2
PI3	Do you enjoy group activities and group games that focus on hygiene topics?	380	3.54	1.126	2	4
PI4	Do you see that many people wash their hands with soap after using the toilet in your campus?	380	3.67	1.080	1	6
PI5	The majority of people on your campus do not care about handwashing with soap after using the toilet.	380	3.07	1.188	6	1
PI6	Except you, few people see handwashing with soap after using the toilet	380	3.52	1.119	3	5

	as important in your campus.					
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Finally, the questions related to peer influence on hygiene practices are examined. Based on the table, PI4 records the highest mean of 3.67, with a standard deviation of 1.080. The second-highest mean is observed for PI3 at 3.54, and it has a standard deviation of 1.126. This is followed by PI6, which has a mean of 3.52 and a standard deviation of 1.119. Next, PI1 shows the fourth-highest mean of 3.46 with a standard deviation of 1.144, while PI2 reports the fifth-highest mean of 3.27 and a standard deviation of 1.180. Lastly, PI5 has the lowest mean of 3.07 and records the highest standard deviation of 1.188.

4.2 Scale Measurement

4.2.1 Reliability Test

Table 4.11:

Cronbach's Alpha Reliability Analysis

No.	Type of Variable	Name of Variable	Number of Items	Cronbach's Alpha	Reliability Test
1	Dependent Variable	Hygiene Practices	10	0.653	Acceptable - Fair
2	Independent Variable	Knowledge of Hygiene	8	0.744	Acceptable - Good
3	Independent Variable	Attitude on Hygiene	8	0.599	Unacceptable - Poor

4	Independent Variable	Campus Environmental Hygiene	10	0.807	Acceptable
					- Very Good
5	Independent Variable	Peer Influence	6	0.751	Acceptable
					- Good

Table 4.11 shows the value of Cronbach's alpha for each variable. From the table, independent variables such as campus environmental hygiene (0.807) shows an excellent reliability since it is exceeding 0.80. Cronbach's alpha of knowledge of hygiene (0.744) and peer influence (0.751) have a good reliability due to their Cronbach's alpha is between 0.70 to 0.80. However, for the independent variable attitude on hygiene (0.599) shows unacceptable, which is a poor reliability because it is lower than 0.60. For the dependent variable, hygiene practices Cronbach's alpha is 0.653 shows as fair reliability. In short, most variables are acceptable, but the attitude on hygiene scale may require further improvement.

4.3 Preliminary Data Screening

Before performing inferential analysis, preliminary data analysis is conducted to establish that the results of this study are reliable. The two preliminary data analyses implemented are multicollinearity test and normality test.

4.3.1 Multicollinearity Test

Multicollinearity occurs when independent variables are highly correlated with each other, which can affect the stability and interpretation of regression coefficients (Roustaei, 2024). To examine the presence of multicollinearity in this study, two commonly used indicators are applied, namely the variance inflation factor (VIF) and tolerance value. The VIF measures how much the variance of a regression coefficient is inflated due to multicollinearity, while tolerance is the reciprocal of VIF and indicates the proportion of variance not explained by other variables (Akhtar et al., 2024). Generally, a VIF value between 1 and 5 suggests moderate correlation, whereas values exceeding 5 to 10 indicate high multicollinearity. In addition, a lower tolerance value implies a greater likelihood of multicollinearity, particularly when it approaches zero (Roustaei, 2024).

Table 4.12:

Tolerance Value and Variance Inflation Factor (VIF)

Independent Variables	Collinearity statistics	
	VIF	Tolerance
Knowledge of Hygiene	1.492	0.670
Attitude on Hygiene	1.578	0.634
Campus Environmental Hygiene	1.600	0.625
Peer Influence	1.602	0.624

According to Table 4.12, all independent variables have the VIF values less than 10. Besides, their tolerance values are more than 0.1. Thus, it is apparent that there is no multicollinearity issue between the independent variables.

4.3.2 Normality Test

Normality tests are performed to determine the normality of the data after carrying out the multicollinearity test. The normality of the data is examined based on three methods in this study, which are skewness and kurtosis values, a histogram and also a normal Q-Q plot.

Table 4.13:

Normality Test Result

Variables	Skewness	Kurtosis
Dependent Variable: Hygiene Practices	(0.342)	0.982
Independent Variable: Knowledge of Hygiene	(1.541)	3.168
Independent Variable: Attitude on Hygiene	(0.046)	0.928
Independent Variable: Campus Environmental Hygiene	(0.226)	(0.179)
Independent Variable: Peer Influence	(0.238)	(0.214)

First of all, the normality of the data is assessed by examining the skewness and kurtosis values. For large sample sizes (greater than 300), the data is considered normally distributed when the skewness values fall between -2 and +2, and the kurtosis values are within the range of -7 to +7 (Nurtjahjanti et al., 2024). According to Table 4.13, all skewness values are within the acceptable range. Knowledge of hygiene has the highest skewness value of -1.541, while attitude on hygiene records the lowest skewness value of -0.046. In addition, the skewness values for hygiene practices (-0.342), campus environmental hygiene (-0.226), and peer influence (-0.238) are also within the acceptable threshold. Similarly, all kurtosis values are

within the acceptable range of -7 to +7. Knowledge of hygiene shows the highest kurtosis value of 3.168, whereas campus environmental hygiene has the lowest kurtosis value of -0.179. The remaining variables, including hygiene practices (0.982), attitude on hygiene (0.928), and peer influence (-0.214), also fall within the acceptable limits. In conclusion, since all skewness and kurtosis values meet the recommended thresholds, the data for all variables are normally distributed.

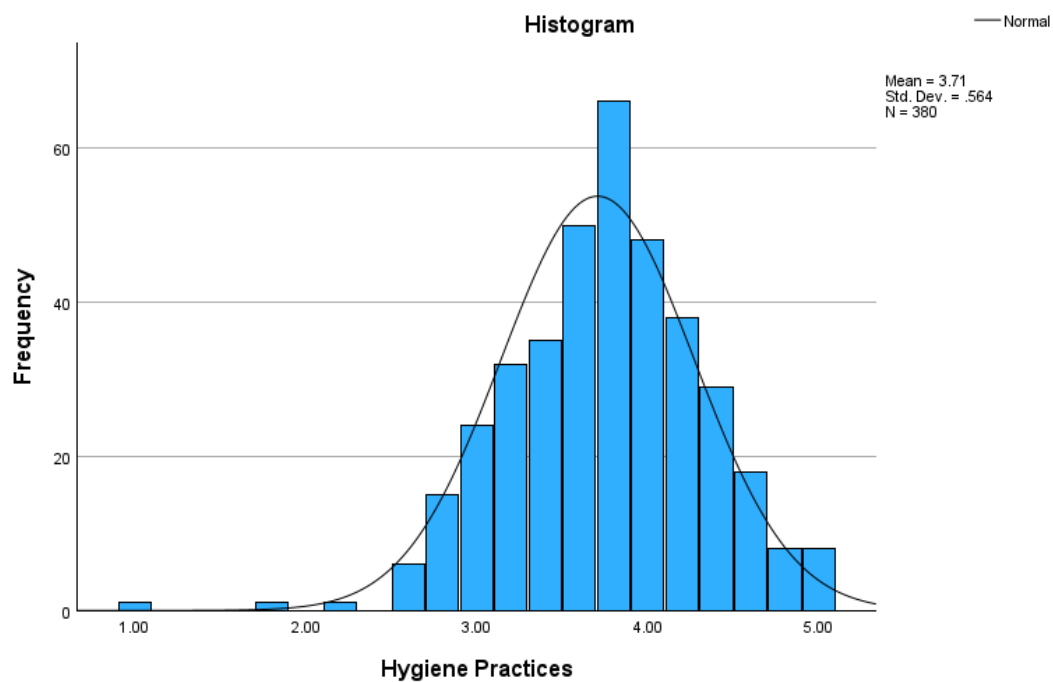


Figure 4.6. Histogram.

Subsequently, a histogram is also utilized to check whether the data satisfies the normalcy assumption. A histogram is a graphical representation used to display the distribution of quantitative data by grouping values into continuous intervals, allowing researchers to easily observe patterns such as frequency, spread, and skewness of the data (Saqib et al., 2025). The histogram showed in Figure 4.6 is constructed regarding the data of our dependent variable, which is the hygiene practices. The distribution plot is built in this histogram, and a normal distribution curve is overlaying on the plot. The distribution plot is seen to closely resemble the normal distribution curve's pattern. Also, the distribution of hygiene practices shows that most of the data values are concentrated around the center, with fewer

observations appearing at both the lower and higher ends. The bars form a roughly symmetrical pattern, and the shape resembles a bell curve. Therefore, the data can be considered approximately normally distributed.

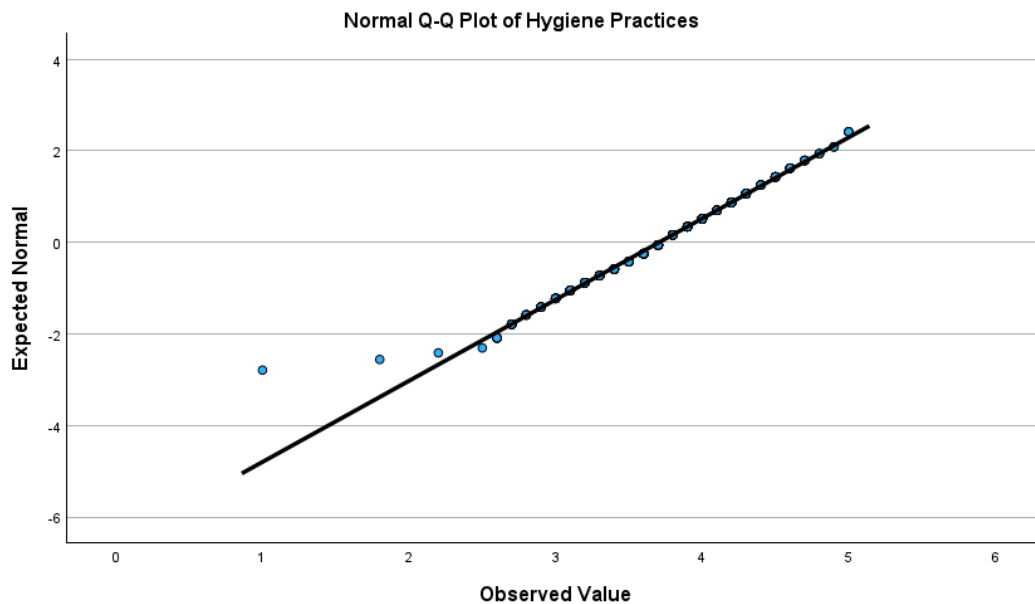


Figure 4.7. Normal Q-Q plot.

Thirdly, a graphical method known as the normal Q–Q plot is used to assess whether the data follows a normal distribution. A Q–Q plot is a scatterplot that compares the quantiles of the sample data with the quantiles of a theoretical distribution, typically the normal distribution (Guzik & Więckowska, 2023). When the two sets of quantiles come from the same distribution, the plotted points will approximately form a straight line, indicating that the data are normally distributed. Conversely, deviations from the straight line suggest departures from normality, particularly in the distribution tails (Yang & Berdine, 2021). Refer to figure 4.7, every data point disperses near to the diagonal line so a pattern that is generally a straight line is shaped. Hence, it is definite that the data has a normal distribution.

4.4 Inferential Analysis

4.4.1 Multiple Regression Analysis

Table 4.14:

Multiple Regression Analysis

	Unstandardized Coefficient Beta	Coefficient Std. Error	Standardized Coefficient Beta	t- statistics	P-value
(Constant)	0.887	0.165		5.367	< 0.001
KOH	0.360	0.043	0.392	8.447	< 0.001
AOH	0.059	0.045	0.063	1.320	0.188
CEH	0.128	0.039	0.157	3.266	0.001
PI	0.191	0.036	0.258	5.362	< 0.001
R-squared					0.458
Adjusted R-squared					0.453
F-test					79.341
P-value					< 0.001 ^b

In this study, the relationship between dependent variable, hygiene practices and the four independent variables, which are knowledge of hygiene (KOH), attitude on hygiene (AOH), campus environmental hygiene (CEH) and peer influence (PI) are determined. According to table 4.15, the outcomes show that KOH, CEH and PI are significant at t-statistics of 8.447, 3.266, 5.362 respectively since the p-values are smaller than 0.10. However, the table do show that the attitude on hygiene (AOH) is insignificant since the p-value is greater than 0.10.

The first independent variable, knowledge of hygiene is significant at 99% of confidence level. This is due to its p-value which is < 0.001 is less than the significance level of 0.01. This outcome complies with the findings of Paul et al. (2020) and Barrett and Cheung (2021). The outcome agrees with this study's expectations that KOH is significantly related to the hygiene practices among the university students. Moreover, the unstandardized regression coefficient is positive at 0.360, which shows that one unit increase in knowledge of hygiene leads to an increase of 0.360 unit in the hygiene practices among university students, *ceteris paribus*.

Next, the second independent variable, attitude on hygiene, is insignificant upon the 90% confidence level. This is because its p-value of 0.188 is greater than the significance level of 0.1. This result conforms to the statement of Rahman et al. (2025) and Kakar et al. (2023). The result assumes that AOH is not significantly related to hygiene practices among the university students. Furthermore, the independent variable AOH does not affect the dependent variable hygiene practices ($P = 0.188 > 0.10$) therefore no statistical significance in the regression model.

Furthermore, campus environmental hygiene, which is the third independent variable in this study, is verified to be significant at 95% of confidence level since its p-value of 0.01 is less than the significance level of 0.05. This significant result is validated by prior findings of Serrem et al. (2021) and Berhanu et al. (2022). The findings align with the expectations of this study, showing that the COH have a significant relationship with the hygiene practices. In addition, the unstandardized regression coefficient is positive at 0.128, which shows that one unit increase in campus environmental hygiene leads to an increase of 0.128 unit in the hygiene practices among university students, holding other variables unchanged.

Besides that, the selected last independent variable in this study is peer influence, is significant at 99% of confidence level. This is because its p-value which is < 0.001 , is less than the significance level of 0.01. This aftermath adheres to the results

of Park and Oh (2023) as well as Madtha et al. (2022). They claim that PI is significantly related to hygiene practices. In addition, the unstandardized regression coefficient is positive at 0.191, which shows that one unit increase in peer influence leads to an increase of 0.191 unit in the hygiene practices among university students, *ceteris paribus*.

Other than that, R-squared (R^2), is also known as the coefficient of determination. It is a statistical measure that indicates the proportion of variance in the dependent variable that can be explained by the independent variables in a regression model (Chicco et al., 2021). It ranges from 0 to 1, where a higher value suggests that the model has greater explanatory power in predicting the outcome variable. The result of 0.458 R^2 represents that 45.8% of the variation in hygiene practices among university students is affected by the combination of knowledge of hygiene, attitude on hygiene, campus environmental hygiene and peer influence. The remaining 54.2% of the variation in the hygiene practices among university students is defined by other compatible elements.

Following this, the regression model is statistically significant at the confidence level of 99% since the p-value of F- test is $< 0.001^b$, which is less than the significance level of 0.01. Therefore, this model significantly illustrates the relationship between the four independent variables, which are knowledge of hygiene, attitude on hygiene, campus environmental hygiene and peer influence and the dependent variable, which is the hygiene practices.

4.5 Conclusion

SPSS version 30.0 is being used to conduct data analysis. It is very effective in investigating and outlining the data gathered from the respondents. It is found that the scales for the questionnaire are generally reliable, except for the attitude on hygiene (one of the IV), which had a slightly low Cronbach's Alpha score. Besides, there is no multicollinearity and non-normality problem. Overall, from the multiple regression analysis, all the four IVs are related to the hygiene practices. Only one of the IVs, the attitude on hygiene shows an insignificant relationship towards hygiene practices. The others show significant relationships towards hygiene practices.

CHAPTER 5: DISCUSSION AND CONCLUSION

5.0 Introduction

Chapter Five presents a more detailed and comprehensive discussion of the findings from Chapter Four. It begins by summarizing the results of the inferential analysis. This is then followed by an explanation of the reasons behind the obtained results. The chapter also discusses how the findings can be applied in practical situations. Lastly, it highlights the limitations of the study and provides suggestions for future research improvements.

5.1 Summary of Statistical Analysis

Table 5.1:

Summary of the Statistical Findings

Independent Variables	T-statistics	P-value	Results
Knowledge of Hygiene	8.447	<0.001	Significant
Attitude on Hygiene	1.320	0.188	Insignificant
Campus Environmental Hygiene	3.366	0.001	Significant
Peer Influence	5.362	<0.001	Significant

According to Table 5.1, attitude on hygiene has insignificant relationship with hygiene practices among university students, while knowledge of hygiene, campus environmental hygiene and peer influence have significant relationship with

hygiene practices among university students. Hence, attitude on hygiene is insignificant factor, whereas knowledge of hygiene, campus environmental hygiene and peer influence are major contributing factors of the hygiene practices among university students.

5.2 Discussion on Major Findings

This section takes a closer look at the key findings that were briefly outlined in Section 5.1. Each finding is explored in more depth, with a focus on how it relates to the initiatives and efforts carried out by the university.

5.2.1 Knowledge of Hygiene and Hygiene Practices

The findings of this study show a significant relationship between knowledge of hygiene and hygiene practices among university students. This indicates that students with higher hygiene knowledge are more likely to engage in proper hygiene behaviours in their daily lives. This is consistent with previous studies, which highlight that knowledge plays an important role in shaping behaviour (Bhagavathula et al., 2020; Zhong et al., 2020). When students are well-informed, they are more aware of the importance of hygiene and its impact on health. In addition, higher hygiene knowledge is associated with better hygiene practices, particularly in shared environments such as classrooms and hostels. Students who understand the risks of poor hygiene tend to practice cleanliness more consistently and are more cautious in their daily behaviours. For example, based on the survey findings, many UTAR students demonstrated that they are knowledgeable about the correct steps of handwashing and understand its importance in preventing diseases, especially after eating and using the toilet. This finding further supports the role of

knowledge as an important factor influencing hygiene practices among university students.

5.2.2 Attitude on Hygiene and Hygiene Practices

The study's outcomes showed that there is an insignificant influence between attitude toward hygiene and hygiene practices among university students. This result is consistent with Betsch et al. (2020) and Shiloh et al. (2021), who found that positive attitudes do not always lead to corresponding health behaviours. This may be because attitude alone is not sufficient to ensure consistent hygiene practices, as individuals may express favourable attitudes but fail to translate them into actual behaviour. Students may perceive hygiene as important but still demonstrate inconsistent practices in their daily routines. Based on the survey findings, many UTAR students acknowledged that they should wash their hands after using the toilet and cover their mouth when sneezing or coughing; however, some still engage in improper practices such as using their teeth to open containers or cut objects. This reflects a gap between what students believe and what they actually practice. According to Betsch et al. (2020), individuals' attitudes do not always predict their behaviours, especially when other situational or behavioural factors are involved. This indicates that attitude alone may not be a strong predictor of hygiene practices among university students.

5.2.3 Campus Environmental Hygiene and Hygiene Practices

The study's outcomes showed that there is a significant relationship between campus environmental hygiene and hygiene practices among university students. This result is consistent with previous studies, which found that environmental

conditions and availability of sanitation facilities significantly influence students' hygiene behaviour (Kabir et al., 2021f; Melaku et al., 2023). This may be due to the fact that a clean and well-maintained campus environment encourages students to adopt proper hygiene practices, as access to facilities such as clean toilets and handwashing stations supports consistent hygiene behaviour. For instance, in UTAR, hygiene facilities such as soap provided in toilets and cafeterias, as well as hand sanitizers placed outside classrooms and along corridors, may encourage students to practice better hygiene in their daily routines. Students who are exposed to a hygienic campus environment are more likely to maintain cleanliness consistently. This indicates that campus environmental hygiene is a key factor influencing hygiene practices among university students.

5.2.4 Peer Influence and Hygiene Practices

The study's outcomes showed that there is a significant relationship between peer influence and hygiene practices among university students. This result is consistent with recent studies, which found that social norms and peer behaviours significantly influence hygiene practices among students and communities (Dwipayanti et al., 2021c; Shinde et al., 2025). This may be due to individuals tend to observe and follow the behaviours of those around them, especially in shared environments such as universities, where peer interaction is frequent. Students may be influenced by their peers through observation and social interaction. For instance, UTAR students may notice whether their peers wash their hands after using the toilet or use hand sanitizers around campus, and such behaviours can shape their own hygiene practices. In addition, discussions about hygiene topics in class or within the university environment may further reinforce these behaviours. Previous research has shown that perceived social norms, such as believing that peers are practicing hygiene behaviours, can significantly increase individuals' likelihood of adopting similar practices (Dwipayanti et al., 2021c).

5.3 Implications of the Study

In this section, the practical implications are presented. Based on the findings from the data analysis, the focus is on the actions that university management, relevant authorities, and students can take to improve hygiene practices among university students.

5.3.1 Managerial Implications

Based on the multiple regression analysis, it was found that the first independent variable, knowledge of hygiene, has a significant influence on hygiene practices among university students. This indicates that improving students' knowledge of hygiene may lead to better hygiene practices in their daily lives. Therefore, the university should place greater emphasis on strengthening students' understanding of proper hygiene practices through educational activities and awareness efforts. This is supported by previous studies showing that hygiene-related knowledge is linked to better hygiene behaviour among university students. For example, Oo et al. (2021b) reported that individuals in Malaysia demonstrated good knowledge of hand hygiene, which was associated with better hygiene behaviour, although consistent practice still required improvement. Similarly, Duong et al. (2021b) found that Vietnamese university students had high knowledge of handwashing, but practice still needed reinforcement, highlighting the importance of continuing education. Findings from this study also show that many UTAR students know the correct steps of handwashing and understand its importance in preventing disease, especially after using the toilet and before eating. By continuing to improve students' hygiene knowledge, the university may be able to encourage more consistent hygiene practices among students.

Besides, attitude toward hygiene, which is the second independent variable in this study, was found to have an insignificant relationship with hygiene practices among UTAR university students. This suggests that having a positive attitude alone may not be enough to influence students' actual hygiene behaviours. Therefore, relying only on attitude-based approaches may not effectively improve hygiene practices among students. To address this, the university can focus on helping students turn their attitudes into real actions. UTAR can include more hygiene-related discussions in classes or student activities, giving students the chance to reflect on their daily habits. Through sharing and discussions with peers, students may become more aware of the gap between what they believe and what they do. In addition, the university can encourage a sense of personal responsibility among students when it comes to hygiene practices. When students become more aware of how their actions affect themselves and others, they are more likely to act in line with their attitudes. By focusing on closing this gap between attitude and behaviour, the university can more effectively improve hygiene practices among students.

The third independent variable, campus environmental hygiene, was found to have a significant influence on hygiene practices among UTAR university students. This shows that a clean campus environment and the availability of hygiene facilities, such as water, soap, and proper sanitation, play an important role in encouraging students to practice good hygiene. Therefore, universities should continue to maintain and improve the overall cleanliness of the campus to support better hygiene behaviour among students. To achieve this, UTAR can strengthen its monitoring and maintenance efforts to ensure that hygiene facilities and shared spaces like restrooms, lecture halls, and cafeterias are always clean and well-maintained. Regular checks and timely replenishment of hygiene resources are important to ensure that the campus environment remains consistently hygienic. In addition, the university can increase awareness by using reminders and visual cues to encourage students to make full use of the available facilities and maintain cleanliness in their daily routines. When both the environment and student behaviour are supported, students are more likely to practice proper hygiene consistently. Therefore, maintaining a clean campus environment can effectively promote better hygiene practices among university students.

Finally, the final independent variable in this study is peer influence, which was found to have a significant relationship with hygiene practices among UTAR university students. This shows that students are influenced by the behaviours and expectations of people around them. Therefore, universities can make use of peer influence to encourage better hygiene practices among students. UTAR can encourage more student-led efforts where students help promote good hygiene within their own social groups. For example, student leaders or group representatives can set a good example by practicing proper hygiene in their daily campus life. When students see their peers doing the right thing, they are more likely to follow. The university can also create more opportunities for students to interact and influence each other through group-based activities related to hygiene. Through these interactions, good hygiene practices can become a shared habit among peers. When such behaviours are commonly practiced within a group, students are more likely to adopt and maintain them consistently. Overall, making good use of peer influence can help improve hygiene practices among university students.

5.4 Limitations of Study

There are several limitations in this study. Firstly, this study focuses only on students from Universiti Tunku Abdul Rahman (UTAR). Although UTAR students represent a relevant group for understanding hygiene practices, the findings are based solely on data collected from one university. Therefore, the results may not fully represent students from other universities or different educational settings. In addition, factors such as campus environment, student lifestyle, and institutional policies at UTAR may differ from other universities in Malaysia, which may influence hygiene practices differently.

Secondly, this study only examines the relationship between knowledge of hygiene, attitude on hygiene, campus environmental hygiene, and peer influence with hygiene practices. While these variables are considered important in influencing students' hygiene behaviour, other potential factors such as personal habits, cultural background, or access to hygiene facilities were not included in this study. As a result, the study may not capture all factors that could affect hygiene practices among students.

Lastly, the data for this study was collected using a questionnaire distributed through an online survey (Google Form). The questionnaire method was chosen because it is cost-effective and allows data to be collected efficiently from many respondents (Wu, 2022). However, questionnaires have limited flexibility, as respondents can only answer based on the options provided. This may restrict deeper understanding of their actual behaviours and opinions, may result in missing important insights that could be obtained through more detailed methods such as interviews.

5.5 Recommendations for Future Research

Hence, there are several aspects of this study that can be improved in future research on hygiene practices among university students. Improving these areas can help provide a more comprehensive understanding of the factors that influence students' hygiene behaviours. Therefore, several recommendations are proposed in this section.

The first recommendation is that future researchers can include students from other public and private universities in Malaysia so that hygiene practices can be compared across different institutions. This can help identify differences in hygiene behaviours among students from various university environments. Future studies

can also involve students from multiple universities instead of focusing on just one institution. This would help improve the accuracy of the findings and make it easier to generalize the results to a wider population of university students in Malaysia.

The second recommendation is that future researchers could use qualitative research methods in their studies. For example, methods such as face-to-face interviews or focus group discussions can be carried out to better understand the factors that contribute to the increase of hygiene-related diseases among university students. These methods allow researchers to explore students' experiences, opinions, and behaviours in a more detailed and meaningful way. Future studies could also combine both quantitative and qualitative approaches. This can help provide a more complete understanding and give clearer insights into the reasons behind students' hygiene practices.

The third recommendation is that future studies could widen the scope by including more relevant factors related to hygiene practices among university students. Future researchers can also explore how different factors influence each other by looking at mediating and moderating variables. This can help provide a clearer and deeper understanding of how and why students practice hygiene in their daily lives.

5.6 Conclusion

The extreme goal of this study is to examine the factors affecting the increase of hygiene-related diseases among university. Questionnaires were distributed to collect data, and SPSS 30.0 was used to analyse the data. The results indicate that the hypotheses developed in this study are partially supported. This shows that knowledge of hygiene, campus environmental hygiene, and peer influence have significant influences on hygiene practices, while attitude on hygiene shows a weaker or less consistent effect. These findings are thoroughly discussed, and several implications are highlighted. Lastly, the limitations of the study are addressed, and corresponding resolutions are given for future research. Thus, this study contributes useful insights for future researchers in terms of respondent selection, data collection methods, and variable selection.

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APPENDIX 1.1: SURVEY QUESTIONNAIRE

Dear Respondents,

We are the students from BACHELOR OF BUSINESS ADMINISTRATION (HONOURS) HEALTHCARE MANAGEMENT from Universiti Tunku Abdul Rahman (UTAR). The purpose of this study is to investigate the factors affecting the increase of hygiene-related diseases among university students.

This questionnaire consists of 6 sections:

Section A: Demographic Profile

Section B: Hygiene Practices

Section C: Knowledge of Hygiene

Section D: Attitude on Hygiene

Section E: Campus Environmental Hygiene

Section F: Peer Influence

Please read the instructions carefully before answering the questions.

Please answer ALL questions in ALL sections.

Completion of this questionnaire will take you approximately 5 to 10 minutes.

Your participation in this study is entirely voluntary. There will be no disadvantage if you decide not to complete the attached anonymous questionnaire. You can withdraw at any time without any penalty. You can refuse to answer any question at any time if you feel uncomfortable.

The information collected from you will be kept strictly private and confidential.

All responses and findings will be used solely for academic purpose.

Your assistance in completing this questionnaire is very much appreciated. Thank you for your participation.

If you have any question regarding to this questionnaire, you may contact us at waiyanleong18@1utar.my.

If you decide to complete this attached anonymous questionnaire, this will be taken as your voluntary agreement and formal consent to participate in this study.

Yours sincerely,

Leong Wai Yan

Yap Zhi Xuan

PERSONAL DATA PROTECTION NOTICE

Please be informed that in accordance with Personal Data Protection Act 2010 (“PDPA”) which came into force on 15 November 2013, Universiti Tunku Abdul Rahman (“UTAR”) is hereby bound to make notice and require consent in relation to collection, recording, storage, usage and retention of personal information.

1. Personal data refers to any information which may directly or indirectly identify a person which could include sensitive personal data and expression of opinion. Among others it includes: Name, identity card, place of birth, address, education history, employment history, medical history, blood type, race, religion, photo, personal information and associated research data.

2. The purposes for which your personal data may be used are inclusive but not limited to:

- a) For assessment of any application to UTAR
- b) For processing any benefits and services
- c) For communication purposes
- d) For advertorial and news
- e) For general administration and record purposes
- f) For enhancing the value of education
- g) For educational and related purposes consequential to UTAR
- h) For replying any responds to complaints and enquiries
- i) For the purpose of our corporate governance
- j) For the purposes of conducting research/ collaboration

3. Your personal data may be transferred and/or disclosed to third party and/or UTAR collaborative partners including but not limited to the respective and appointed outsourcing agents for purpose of fulfilling our obligations to you in respect of the purposes and all such other purposes that are related to the purposes and also in providing integrated services, maintaining and storing records. Your data may be shared when required by laws and when disclosure is necessary to comply with applicable laws.

4. Any personal information retained by UTAR shall be destroyed and/or deleted in accordance with our retention policy applicable for us in the event such information is no longer required.

5. UTAR is committed in ensuring the confidentiality, protection, security and accuracy of your personal information made available to us and it has been our ongoing strict policy to ensure that your personal information is accurate, complete, not misleading and updated. UTAR would also ensure that your personal

data shall not be used for political and commercial purposes.

Consent:

1. By submitting or providing your personal data to UTAR, you had consented and agreed for your personal data to be used in accordance to the terms and conditions in the Notice and our relevant policy.

2. If you do not consent or subsequently withdraw your consent to the processing and disclosure of your personal data, UTAR will not be able to fulfill our obligations or to contact you or to assist you in respect of the purposes and/or for any other purposes related to the purpose.

3. You may access and update your personal data by writing to us at waiyanleong18@1utar.my.

Acknowledgment of Notice

☐ I have been notified and that I hereby understood, consented and agreed per UTAR above notice.

☐ I disagree, my personal data will not be processed.

SECTION A: DEMOGRAPHIC PROFILE

1. Gender

☐ Male ☐ Female

2. Age range (year)

☐ <18 ☐ 18 – 20 ☐ 21 – 23 ☐ 24 – 26 ☐ >26

3. Ethnicity

☐ Malay ☐ Indian ☐ Chinese ☐ Other: _____

4. Current year of study

☐ Year 1 ☐ Year 2 ☐ Year 3 ☐ Year 4

5. Faculty

- ☐ Centre of Foundation Studies (CFS)
- ☐ Faculty of Arts and Social Science (FAS)
- ☐ Teh Hong Piow Faculty of Business and Finance (THP FBF)
- ☐ Faculty of Science (FSc)
- ☐ Faculty of Engineering and Green Technology (FEGT)
- ☐ Faculty of Information and Communication Technology (FICT)
- ☐ Institute of Chinese Studies (ICS)
- ☐ Institute of Postgraduate Studies and Research (IPSR)

SECTION B: HYGIENE PRACTICES

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of frequency

1 - Never; 2 - Occasionally; 3 - Sometimes; 4 - Often; 5 - Always

1. Do you wash your hands with water and soap before and after using the restroom?

☐1 ☐2 ☐3 ☐4 ☐5

2. Do you usually use alcohol-based products for hand hygiene?

☐1 ☐2 ☐3 ☐4 ☐5

3. Do you use paper towels to dry your hands in and out of college?

☐1 ☐2 ☐3 ☐4 ☐5

4. Do you wash your hands before eating in the cafeteria?

☐1 ☐2 ☐3 ☐4 ☐5

5. Do you sneeze or touch your mouth and nose while eating in the cafeteria?

☐1 ☐2 ☐3 ☐4 ☐5

6. Do you wash your hands after wiping or blowing your nose in the classroom?

☐1 ☐2 ☐3 ☐4 ☐5

7. Do you wash your hands after touching stray animals or plants on campus?

☐1 ☐2 ☐3 ☐4 ☐5

8. Do you chase away the flies from your food in the university canteen?

☐1 ☐2 ☐3 ☐4 ☐5

9. Do you touch food and money at the same time when you pay at the university canteen?

☐1 ☐2 ☐3 ☐4 ☐5

10. Do you dispose of the food waste properly in the university canteen?

☐1 ☐2 ☐3 ☐4 ☐5

SECTION C: KNOWLEDGE OF HYGIENE

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement

1 - Strongly disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly agree

1. Washing my hands after using toilets is good hygiene practice.

☐1 ☐2 ☐3 ☐4 ☐5

2. Washing my hands before and after eating is good hygiene practice.

☐1 ☐2 ☐3 ☐4 ☐5

3. I understand the importance of soap for hand washing.

☐1 ☐2 ☐3 ☐4 ☐5

4. I understand the steps to wash hands properly.

☐1 ☐2 ☐3 ☐4 ☐5

5. I understand hand washing may prevent illness.

☐1 ☐2 ☐3 ☐4 ☐5

6. I understand the importance of maintaining toilet cleanliness in the university.

☐1 ☐2 ☐3 ☐4 ☐5

7. I understand unhygienic conditions can cause harmful disease.

☐1 ☐2 ☐3 ☐4 ☐5

8. Smoking should be allowed in the area of the canteen.

☐1 ☐2 ☐3 ☐4 ☐5

SECTION D: ATTITUDES ON HYGIENE

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of agreement

1 - Strongly disagree; 2 - Disagree; 3 - Neutral; 4 - Agree; 5 - Strongly agree

1. I should wash my hands before and after eating in the cafeteria.

☐1 ☐2 ☐3 ☐4 ☐5

2. It is not always possible to wash one's hand before eating in the cafeteria.

☐1 ☐2 ☐3 ☐4 ☐5

3. I should wash my hands with soap after the toilet.

☐1 ☐2 ☐3 ☐4 ☐5

4. I may forget to wash my hands after the toilet.

☐1 ☐2 ☐3 ☐4 ☐5

5. I should cover my nose and mouth with a tissue when sneezing or coughing in the classrooms/lecture halls.

☐1 ☐2 ☐3 ☐4 ☐5

6. I will use my teeth to cut things and open containers without any tools in the campus area.

☐1 ☐2 ☐3 ☐4 ☐5

7. I have never attended any school workshops to raise awareness about chronic and infectious diseases, their causes, and prevention methods.

☐1 ☐2 ☐3 ☐4 ☐5

8. I like to see the cleanliness at the university campus area.

☐1 ☐2 ☐3 ☐4 ☐5

SECTION E: CAMPUS ENVIRONMENTAL HYGIENE

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of frequency

1 - Never; 2 - Occasionally; 3 - Sometimes; 4 - Often; 5 - Always

1. Does soap available in the restrooms of the university?

☐1 ☐2 ☐3 ☐4 ☐5

2. Does the hand dryer machine provide in the restrooms?

☐1 ☐2 ☐3 ☐4 ☐5

3. Do sanitizers be distributed in laboratories, classrooms, corridors, and restrooms of the university?

☐1 ☐2 ☐3 ☐4 ☐5

4. Does a trash bin provide everywhere in the campus where trash is created?

☐1 ☐2 ☐3 ☐4 ☐5

5. Does the trash bin use an appropriate design and materials, so that they do not leak, are waterproof and have a cover?

☐1 ☐2 ☐3 ☐4 ☐5

6. Does the cafeteria provide water and soap for washing hands?

☐1 ☐2 ☐3 ☐4 ☐5

7. Are basins for hands and utensils washing separated in the cafeteria?

☐1 ☐2 ☐3 ☐4 ☐5

8. Does the cafeteria have sealed storage?

☐1 ☐2 ☐3 ☐4 ☐5

9. Does the cafeteria clean with no trash?

☐1 ☐2 ☐3 ☐4 ☐5

10. Does the cafeteria provide protection from mice, bugs and birds?

☐1 ☐2 ☐3 ☐4 ☐5

SECTION F: PEER INFLUENCE

Please choose the most appropriate option that best indicates your agreement level about the following statements.

Level of frequency

1 - Never; 2 - Occasionally; 3 - Sometimes; 4 - Often; 5 - Always

1. Do you learn to cooperate in group settings and group discussions about hygiene?

☐1 ☐2 ☐3 ☐4 ☐5

2. Do you communicate about hygiene topics in the class?

☐1 ☐2 ☐3 ☐4 ☐5

3. Do you enjoy group activities and group games that focus on hygiene topics?

☐1 ☐2 ☐3 ☐4 ☐5

4. Do you see that many people wash their hands with soap after using the toilet in your campus?

☐1 ☐2 ☐3 ☐4 ☐5

5. The majority of people on your campus do not care about handwashing with soap after using the toilet.

☐1 ☐2 ☐3 ☐4 ☐5

6. Except you, few people see handwashing with soap after using the toilet as important in your campus.

☐1 ☐2 ☐3 ☐4 ☐5

Thank you for helping us! Hope you have a nice day.

**APPENDIX 1.2: TABLE FOR DETERMINATION OF SAMPLE SIZE FROM A
GIVEN POPULATION**

TABLE 1
Table for Determining Sample Size from a Given Population

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size.
S is sample size.

APPENDIX 1.3: MULTIPLE LINEAR REGRESSION ANALYSIS RESULTS

Multiple Regression Analysis

Coefficients ^a								
Model	Unstandardized Coefficients			Standardized Coefficients Beta	t	Sig.	Collinearity Statistics	
	B	Std. Error					Tolerance	VIF
1	(Constant)	.887	.165		5.367	<.001		
	IV1_Mean	.360	.043	.392	8.447	<.001	.670	1.492
	IV2_Mean	.059	.045	.063	1.320	.188	.634	1.578
	IV3_Mean	.128	.039	.157	3.266	.001	.625	1.600
	IV4_Mean	.191	.036	.258	5.362	<.001	.624	1.602

a. Dependent Variable: DV_Mean

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	Change Statistics			
						F Change	df1	df2	Sig. F Change
1	.677 ^a	.458	.453	.41733	.458	79.341	4	375	<.001

a. Predictors: (Constant), IV4_Mean, IV1_Mean, IV2_Mean, IV3_Mean

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	55.273	4	13.818	79.341	<.001 ^b
	Residual	65.311	375	.174		
	Total	120.585	379			

a. Dependent Variable: DV_Mean

b. Predictors: (Constant), IV4_Mean, IV1_Mean, IV2_Mean, IV3_Mean