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**SECI2143**

**PROBABILITY AND STATISTICAL DATA ANALYSIS**

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**SEMESTER 2 2020/2021**

**PROJECT 1 :**

**LECTURER :**

**DR SHARIN HAZLIN HUSPI**

**SUBMITTED BY:**

**GROUP NAME: NEAT FREAK**

<b>NO</b>	<b>NAME</b>	<b>MATRIC NO</b>
<b>1</b>	<b>ERICA DESIRAE MAURITIUS</b>	<b>A20EC0032</b>
<b>2</b>	<b>INDRADEVIA/P VIKNESHWARAN</b>	<b>A20EC0050</b>
<b>3</b>	<b>LUE GUO MING</b>	<b>A20EC0073</b>
<b>4</b>	<b>MOHD FIRDAUS BIN ZAMRI</b>	<b>A20EC0080</b>

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## **INTRODUCTION**

Hygiene has always been an important aspect of our life regardless of age, gender or place. Hygiene is typically assumed to be equivalent to cleanliness. However, the concept of hygiene is a broad spectrum, revolving around, cleanliness, health and wellness. According to the World Health Organization (WHO), “Hygiene refers to conditions and practices that help to maintain health and prevent the spread of diseases”. Besides, hygiene can be divided into various aspects. Some of the few are personal, professional, medical and culinary (food) hygiene.

In the past year, hygiene has been given extra attention as the Covid-19 pandemic surfaced and impacted a huge number of people globally. We could notice almost all the advertisements on personal and house hygiene to lower the Covid-19 infection risk. Regardless, there are so many articles on society disobeying the standard operating procedure (SOP) which are as simple as wearing a mask when being outdoors or maintaining social distance. In addition, during the early months of the pandemic, movement control order (SOP) had been implemented and almost everyone is confined in their respective residence. For almost 3 months of being full time at home and mostly communicating, working as well as studying online, we can surely assume many neglects their personal hygiene as the majority is less active during this period. Nevertheless, of being at home and not active or sweating, having good personal hygiene is always important for our health and well-being.

Our purpose in conducting this online survey is to find out the importance of hygiene care among people, particularly university students. University students sometimes do struggle with maintaining their hygiene with their fast lifestyle as a number of them does not prioritize their hygiene due to the lack of facilities or convenience in the hostels compared to their home. Thus, we were interested to understand the students’ hygiene care and their satisfaction with their living environment. We have categorized hygiene care into 5 categories which are personal, shower, hand, nail and finally teeth hygiene. From this survey, we hope to gain an insight into the typical university student hygiene care and the importance they give to having proper hygiene care.

This report will walk through the data obtained for each category using various graphs and charts. The comparison can be distinguished visually based on the graph and chart in the data analysis.

## **DATA COLLECTION**

### **Methodology**

We created the electronic questionnaire by using the web application - Google Forms, which enable us to conduct an online survey and collect data for this study. The questionnaire was divided into two sessions; Session 1 was asking about the personal information of the respondents; Session 2 were the questions regarding hygiene among university students. In Session 1, we asked about the gender, age and current location of the respondents. In Session 2, the respondents were required to answer the question about their hygiene, environmental hygiene and their living habits. For instance, the hygiene satisfaction of the respondents' living environment, the habits they take a bath, wash their hand, brush their teeth, cut their fingernails, and the soap and body wash brand preference. We had involved multiple-choice selection, dropdown list, checkboxes and linear scale as the data input type in the questionnaire.

### **Sample Selection**

The sample we selected to be our respondents were the students from different faculties in Universiti Teknologi Malaysia (UTM). In this study, we targeted 60 random students in UTM as our sample, finally, we ended up with 62 respondents to answer the questionnaire. We distributed the questionnaire link to several UTM groups via social media platforms which were WhatsApp and Telegram application.

**The Parameters and Variables**

<b>Variable</b>	<b>Data Type</b>	<b>Measurement Level</b>	<b>Parameter</b>
Personal Information (Gender, Current Location)	Qualitative	Nominal	Mode
Personal Information (Age)	Quantitative	Ratio	Mean
Hygiene Satisfaction of Living Environment	Categorical	Ordinal	Mean
Times and Bathing Duration	Quantitative	Interval	Mean
Soap/ Body Wash Brand Preference	Qualitative	Ordinal	Mode
Habit to Wash Hand	Qualitative	Ordinal	Mode
Hand Washing Duration	Quantitative	Interval	Mean
Preferred Medium to Clean Hand	Qualitative	Nominal	Mode
Finger Nail Biting and Cutting Habits	Qualitative	Nominal	Mode
Number of times to brush teeth	Quantitative	Interval	Mean
Period to brush teeth	Qualitative	Ordinal	Mode

**DATA ANALYSIS**

a) Personal Background

Age	Frequency	Midpoint	Cumulative Frequency
18-20	41	19	41
21-23	20	22	61
24-26	1	25	62
>26	0	27	62
Total	62		

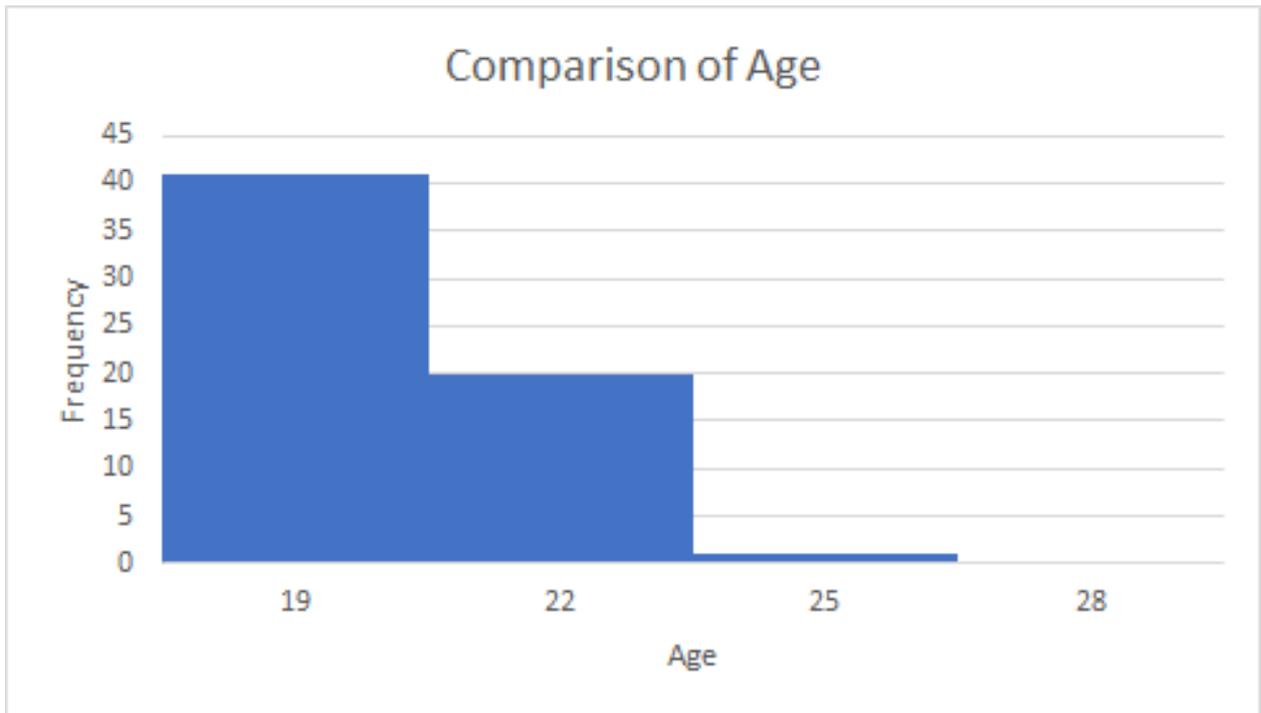
$$\begin{aligned}
 \text{Mean, } \bar{x} &= \frac{\sum_{i=1}^n X_i}{n} \\
 &= \frac{8(10)+29(30)+18(50)+7(70)}{62} \\
 &= \frac{2340}{62} \\
 &= 37.74
 \end{aligned}$$

$$\begin{aligned}
 \text{Median class} &= 62/2 \\
 &= 31^{\text{th}} \\
 &= 0-20
 \end{aligned}$$

$$\begin{aligned}
 \text{Median} &= L + \frac{\frac{N}{2} - cf_p}{f_{med}} (W) \\
 &= 20 + \frac{\frac{62}{2} - 8}{29} (20) \\
 &= 35.86
 \end{aligned}$$

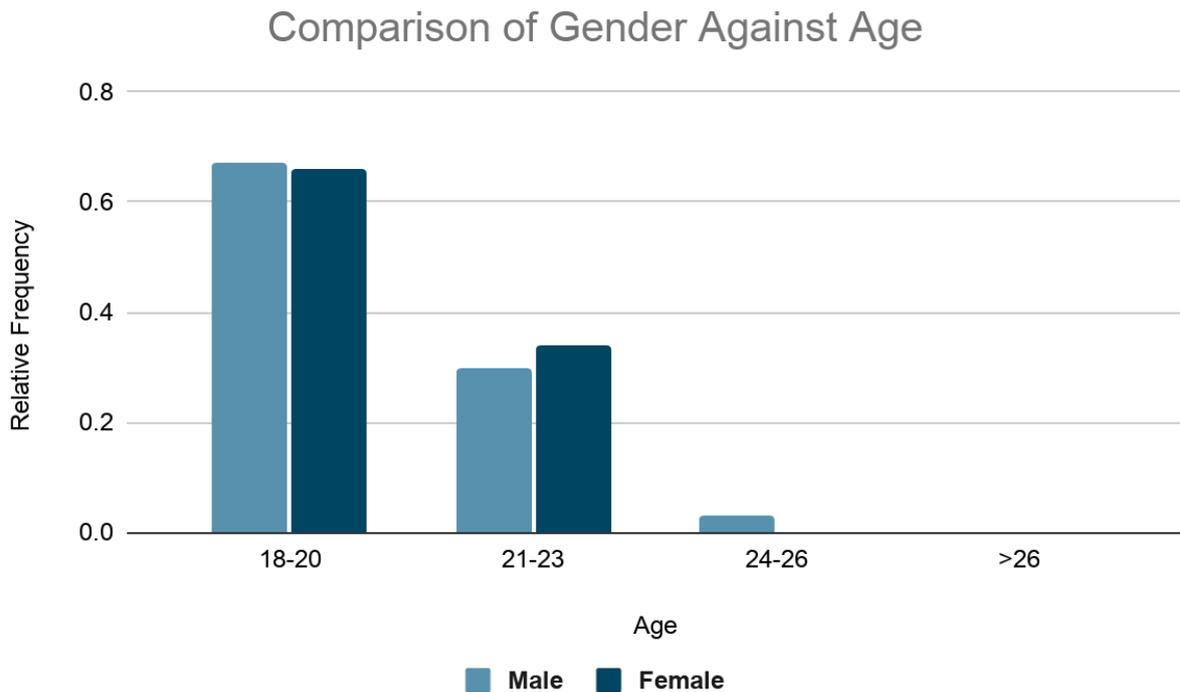
$$\text{Modal class} = 20-40$$

$$\begin{aligned}
 \text{Mode} &= l + h \left( \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \\
 &= 20 + 20 \left( \frac{29 - 8}{2(29) - 8 - 18} \right) \\
 &= 33.13
 \end{aligned}$$



*Figure 1 Comparison of Age*

Figure 1 shows that the highest frequency of respondents aged between 18 to 20 years old with a frequency of 40, followed by 20 and 1 of respondents aged between 21 to 23 years old and between 24 to 26 years respectively. However, there are no respondents that are older than 26 years old.

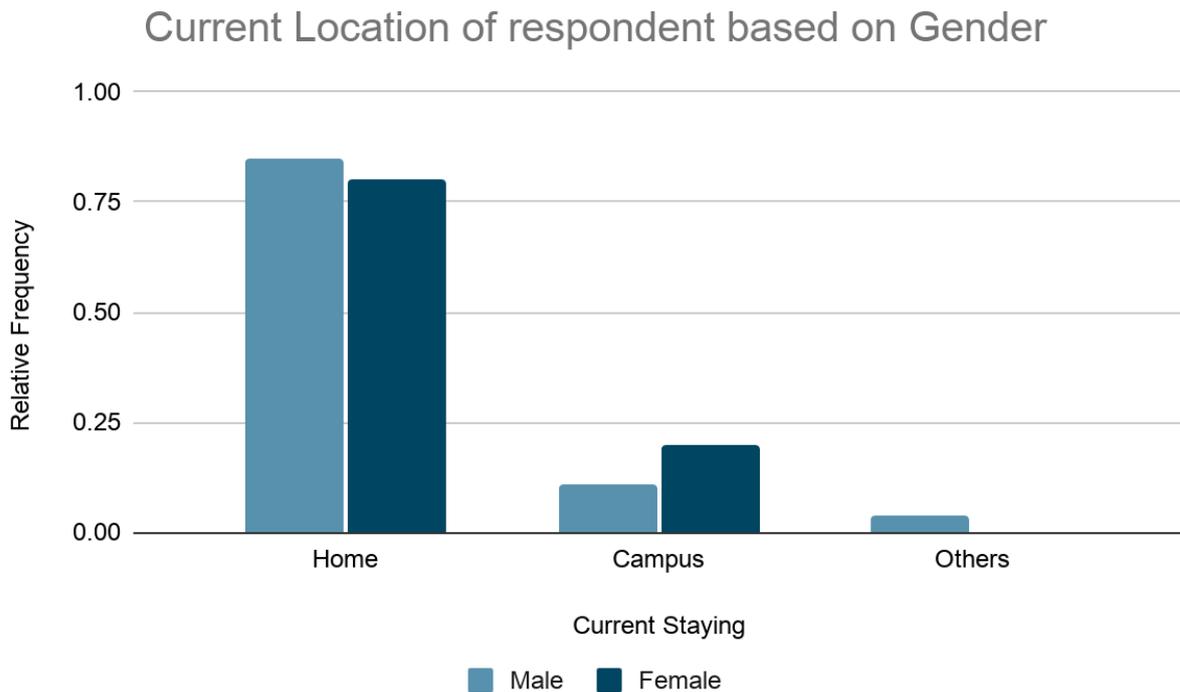


*Figure 2 Comparison of Gender Against Age*

***The mode for female respondents is 0.66 (66%).***

***The mode for male respondents is 0.67 (67%).***

The Bar Chart plotted in Figure 1 illustrates that in the age between 18 to 20, male respondents are slightly more than female respondents with a relative frequency of 0.67 and 0.66 respectively. Meanwhile, in the age of 21 to 23, the female respondents (0.34) had a higher relative frequency than male respondents (0.30). However, for the age between 24 to 26, there is only one male respondent. Also, there is neither a male nor female respondent that is older than 26 years.



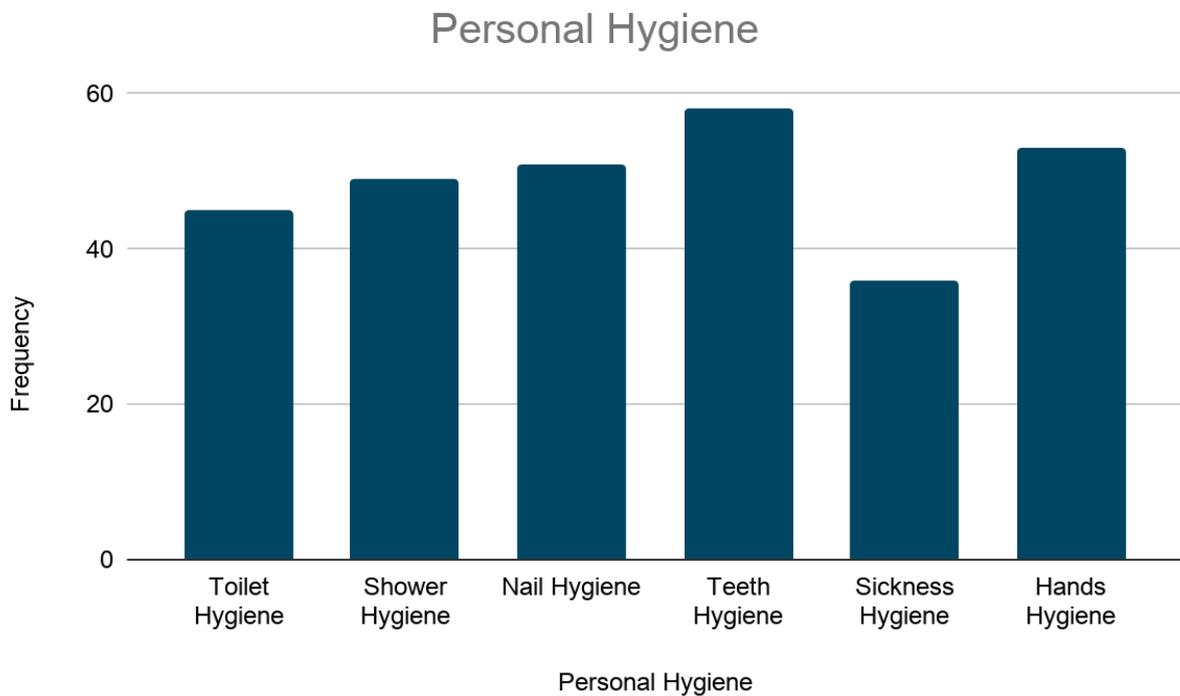
*Figure 3 Current Location of respondent against Gender*

***The mode for male respondents is 0.85 (85%).***

***The mode for female respondents is 0.80 (80%).***

According to the bar chart above, it shows that the highest relative frequency of respondents is currently staying home with 0.85 (85%) male respondents and 0.80 (80%) female respondents. However, some respondents are currently staying at the campus with a relative frequency of 0.11 (11%) male respondents and 0.20 (20%) of female respondents. Besides that, there is one male respondent that is neither staying at home nor on campus.

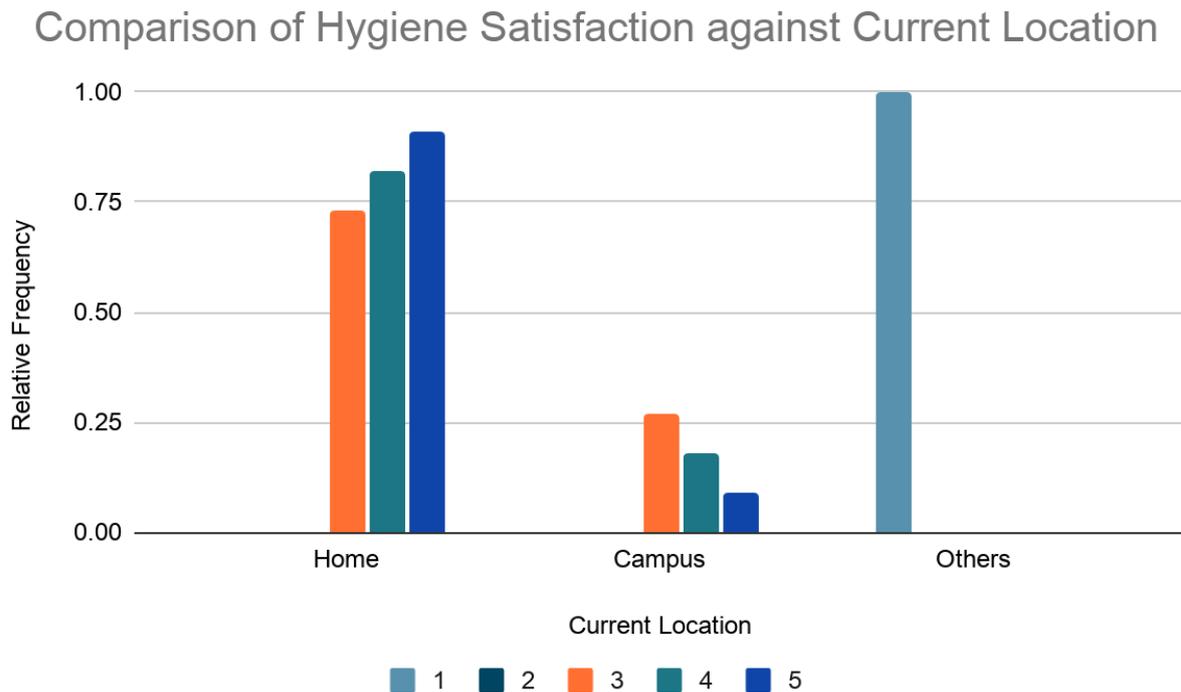
## b) Personal Hygiene



*Figure 4 Personal Hygiene*

***The mode of Personal Hygiene is Teeth Hygiene with a frequency of 58.***

The bar chart above shows that Teeth Hygiene has the highest frequency with 58 over 62 respondents choosing it as their personal hygiene and this is followed by Hands Hygiene with 53 over 62 respondents. The third highest chosen personal hygiene is Nail Hygiene with 51 over 62 respondents. Moreover, the following highest chosen personal hygiene is shower hygiene with 49 over 62 respondents. Next, it is followed by Toilet Hygiene and Sickness Hygiene with 45 and 36 over respondents respectively.



*Figure 5 Comparison of Hygiene Satisfaction against Current Location*

***The mode for ranking 1 (extremely unsatisfied) is a relative frequency of 1.00.***

***Ranking 2 does not have a mode.***

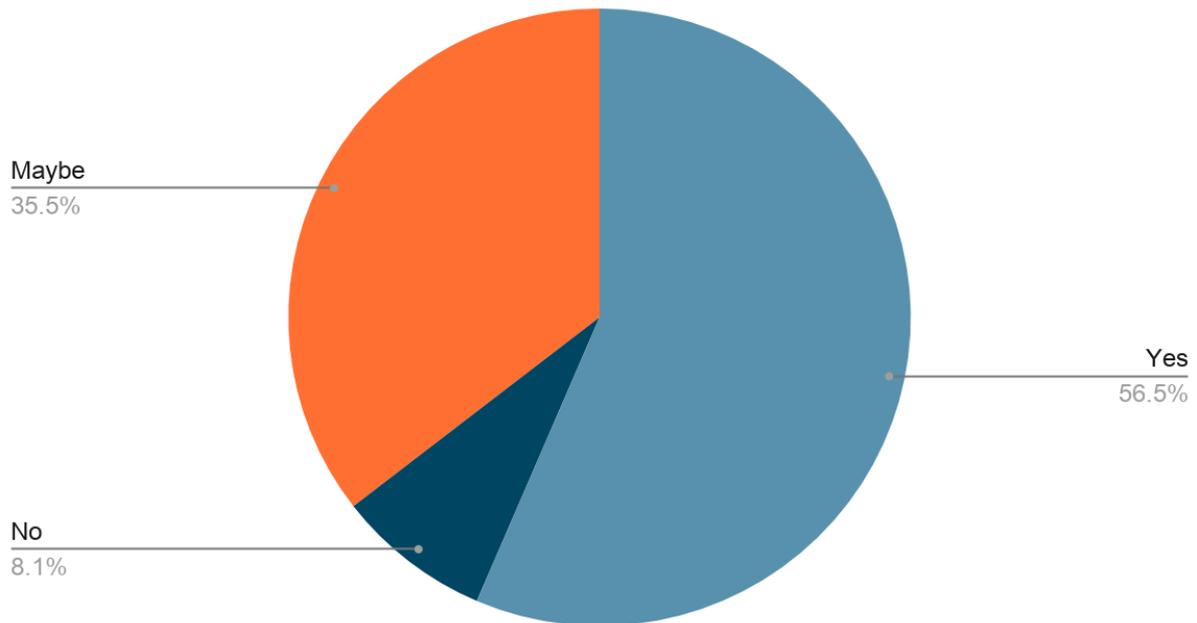
***The mode for ranking 3 is 0.73 (73%).***

***The mode of ranking 4 is 0.82 (82%).***

***The mode of ranking 5 is 0.91 (91%).***

Based on the comparative bar chart above, most of the respondents that currently staying at home are very satisfied with their environment with a relative frequency of 0.91(91%) of the respondents ranked it a 5, 0.82 (82%) of the respondents ranked the environment a 4, 0.73 (73%) ranked a 3, whereas, none of the respondents who are currently staying at home ranked it a 1 or 2. On the other hand, most of the respondents that are staying at campus ranked the environment a 3 with a relative frequency of 0.27 (27%), 0.18 (18%) of the respondents ranked it a 4, 0.09 (9%) of the respondents ranked it a 5, whereas none of the respondents ranked it a 1 or 2. The only respondent that neither is staying at home nor campus ranked his environment a 1.

### Opinion on hygiene can be improved by wearing a mask

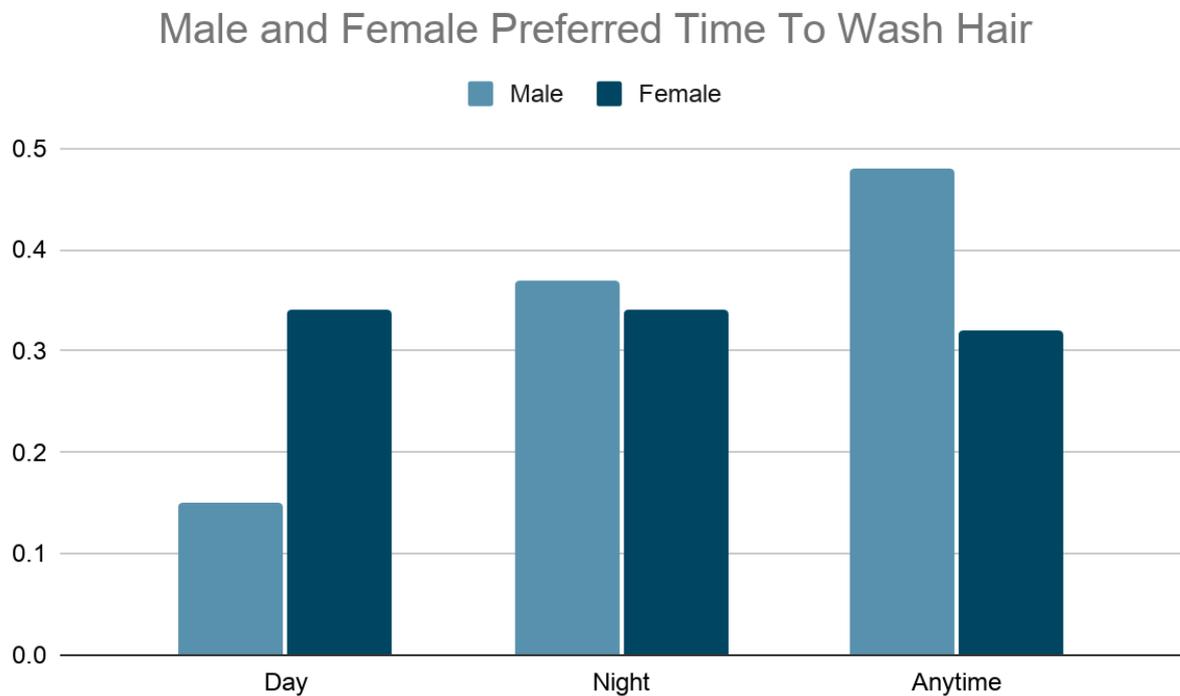


*Figure 6 Opinion on hygiene can be improved by wearing a mask*

***The mode for the opinion about wearing a mask is the Yes option with a percentage of 56.5%.***

Based on the Pie Chart above, it can be seen that 56.5% of respondents agree that wearing a mask can improve their hygiene. On the other hand, 8.1% of respondents think that wearing a mask does not affect their hygiene while 35.5% of respondents are not sure of it either yes or no.

## c) Shower Hygiene

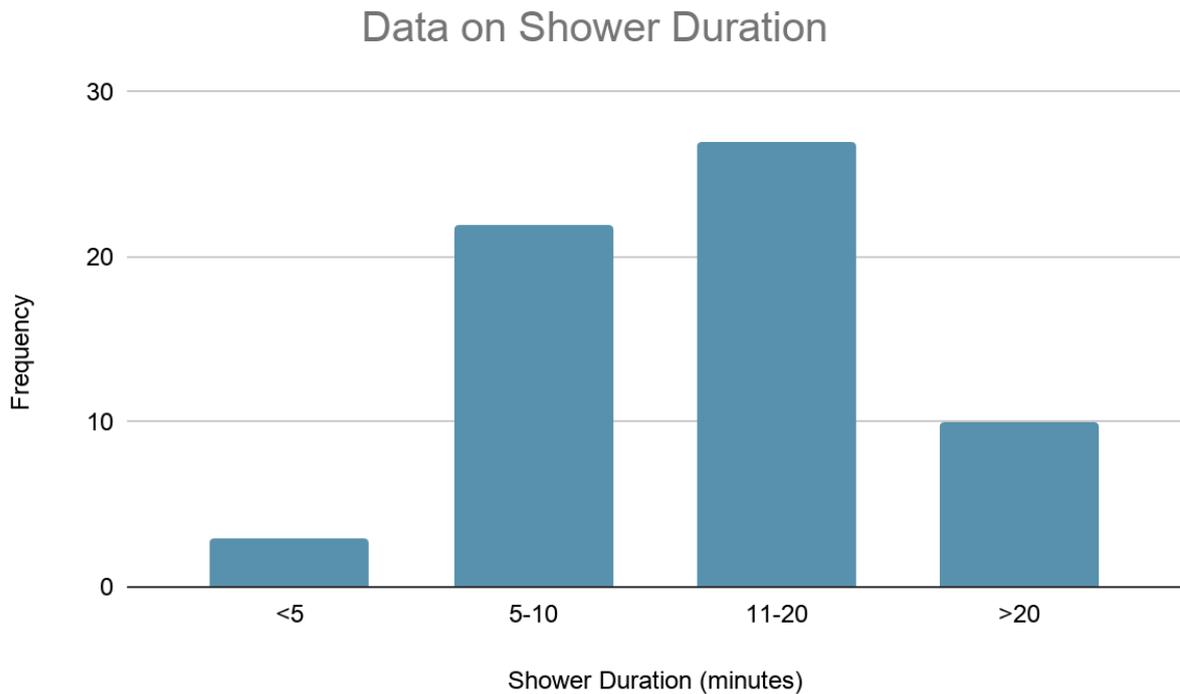


*Figure 7 Male and Female Preferred Time to Wash Hair*

***The mode of male respondents is 0.48 (48%).***

***The mode of female respondents is bimodal with a relative frequency of 0.34 (34%).***

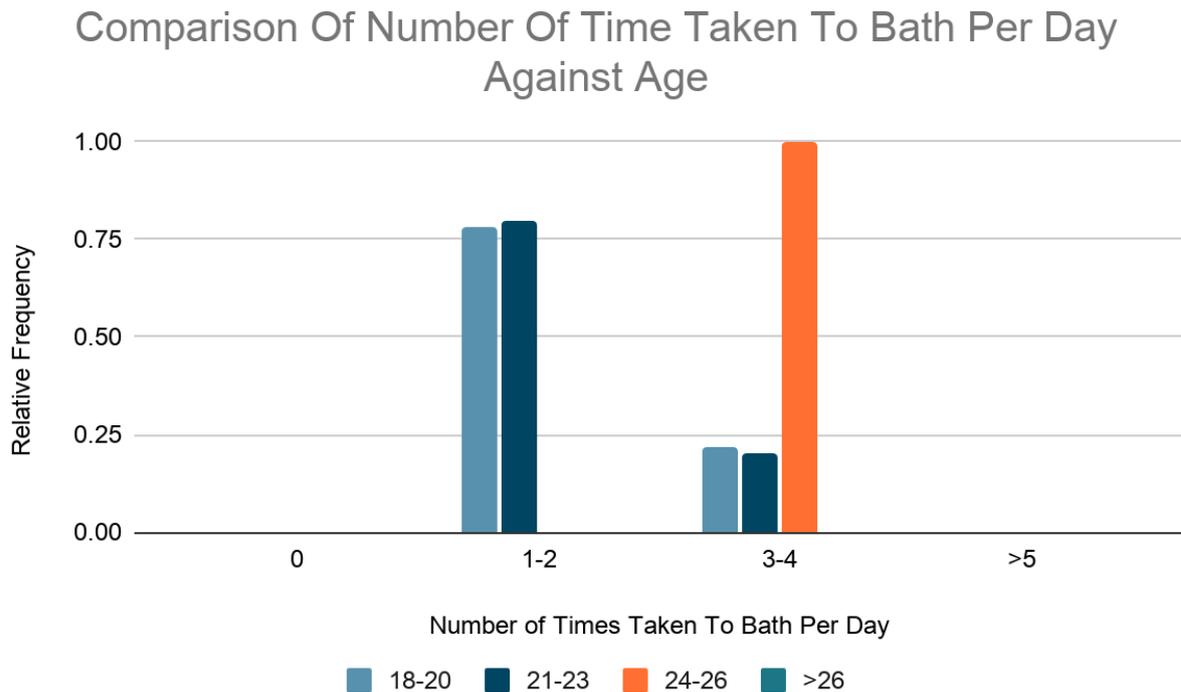
From Figure 7, during the day, the male has the lowest relative frequency which is 0.15. Meanwhile, females prefer to wash their hair during both the day and night since both of the relative frequencies are 0.34. At night, 0.37 male chose to wash their hair. Most of the male respondents do not care when to wash their hair as it is recorded that 0.48 of the male respondents chose anytime as their option. However, only 0.32 female respondents preferred to wash their hair anytime compared to male.



*Figure 20 Data on Shower Duration*

***The mode for shower duration is 11-20 minutes with a frequency of 27.***

The Bar chart plotted above shows that most of the respondents (27 respondents) will take their bath for approximately 11 to 20 minutes, followed by a duration of 5 to 10 minutes with 22 over 62 respondents chose this option. The third highest shower duration is more than 20 minutes with 10 respondents chose this option. However, only 3 out of 62 respondents will have their bath in less than 5 minutes.



*Figure 9 Number of times to bath per day based on age*

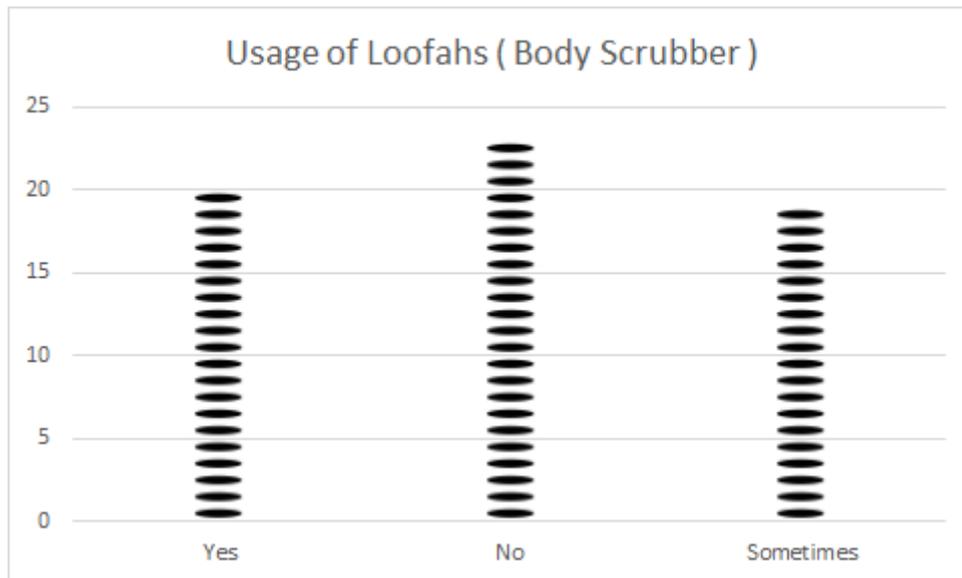
***The mode for respondents aged 18-20 is 0.78 (78%).***

***The mode for respondents aged 21-23 is 0.80 (80%).***

***The mode for respondents aged 24-26 is 1.00 (100%).***

***Respondents aged older than 26 years old have no mode.***

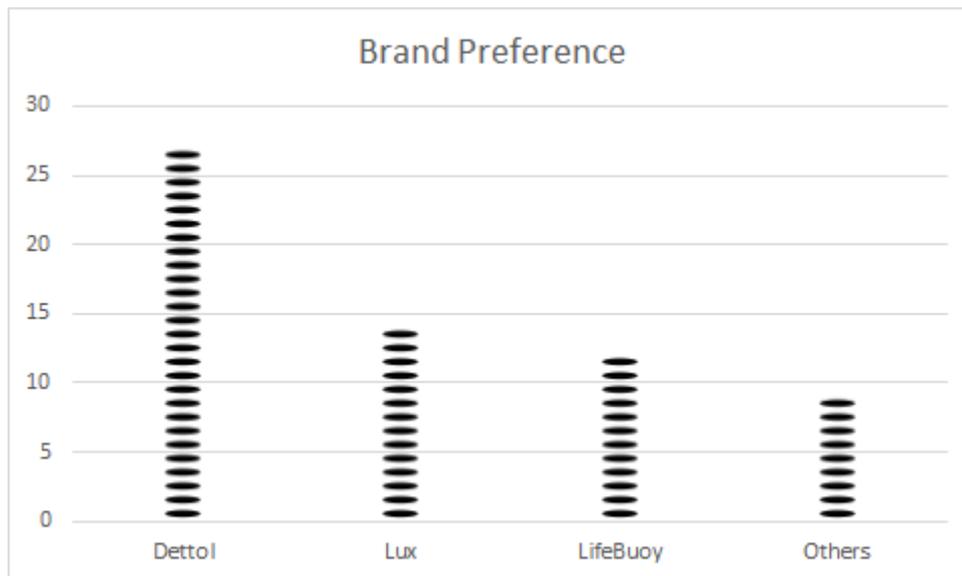
According to the bar chart above, it shows that only the respondents aged between 18 to 20 and 21 to 23 will take a bath once or twice per day with a relative frequency of 0.78 (78%) and 0.80 (80%) respectively. Meanwhile, some respondents aged between 18 to 20 and 21 to 23 will have their bath 3 to 4 times per day with a relative frequency of 0.22 (22%) and 0.20 (20%) respectively. Moreover, the only respondents aged between 24 to 26 will also have his bath 3 to 4 times per day as well. However, none of the respondents stated that they did not even take a bath or take a bath more than 5 times.



*Figure 10 Usage of Loofahs (Body Scrubber)*

***The mode for the usage of Loofahs or Body Scrubber is the No Option with a frequency of 23.***

The dot plot above shows that 23 out of 62 respondents do not use a body scrubber to clean their body. However, the next 20 respondents used body scrubbers to clean their body. Another 19 respondents will only sometimes use the body scrubber when cleaning their body.

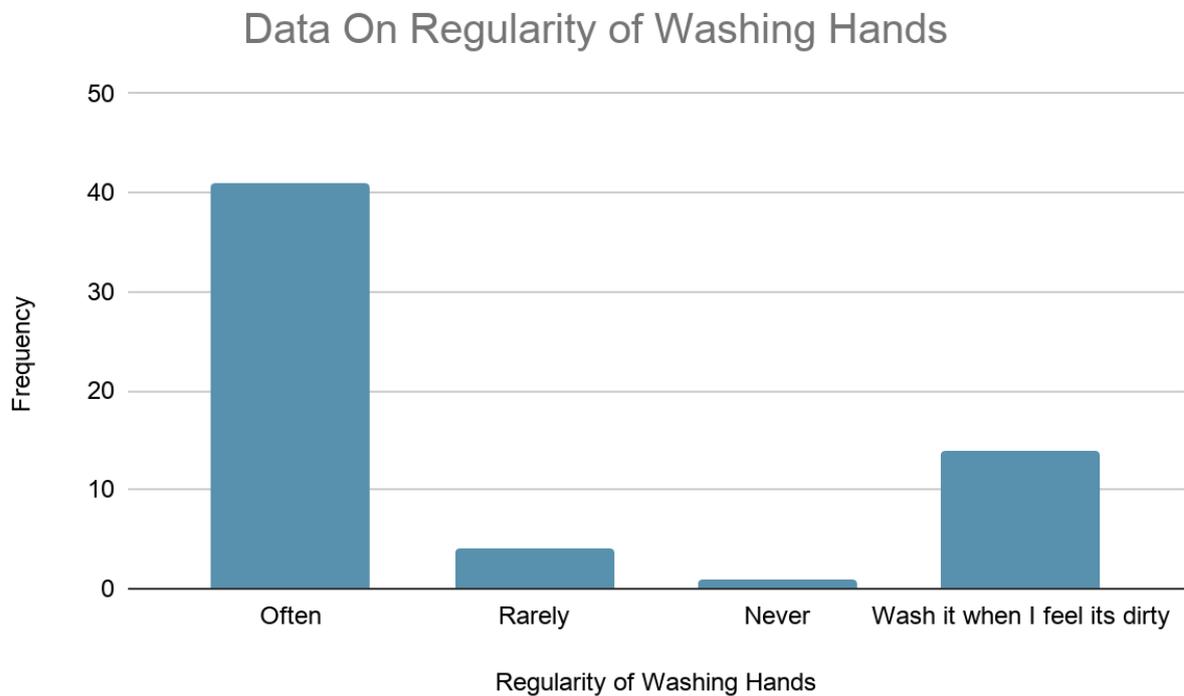


*Figure 11 Body Wash Brand Preference*

***The mode for Body Wash Brand Preference is Dettol with a frequency of 27.***

According to the dot plot above, Dettol has the highest frequency of 27 out of 62 respondents that preferred it as their body wash brand. This is followed by Lux where 14 out of 62 respondents chose it as their body wash brand. Next, 12 out of 62 respondents preferred Lifebuoy as their body wash brand. Lastly, 9 out of 62 respondents choose other brands, for instance, Baby Johnson, Shokobutsu, Herbal Soap, VK Derm Solve, Ginvera, Organic based etc.

## d) Hands Hygiene



*Figure 12 Data on Regularity of Washing Hands*

***The mode for the Regularity of Washing Hands is the Often Option with a frequency of 41.***

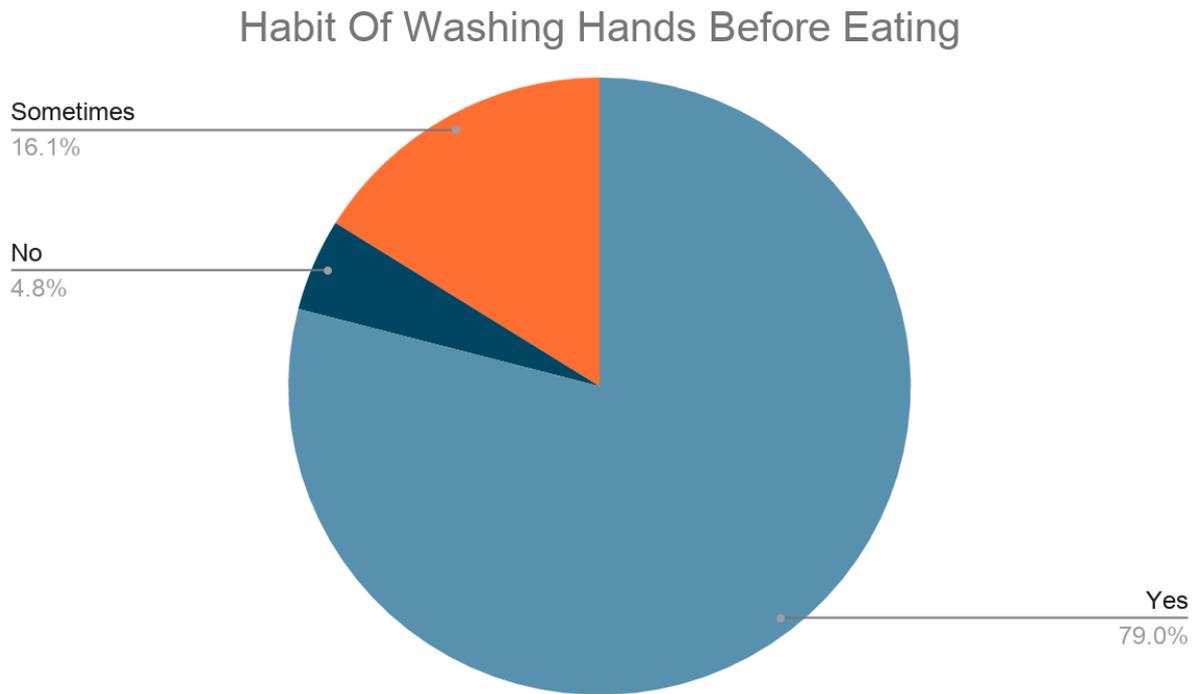
Based on Figure 12, 41 of the respondents often wash their hands while only 4 respondents chose to wash their hands rarely. Compared to 'Rarely', the respondent who chose 'Never' is slightly less which is 1 respondent only. However, 14 out of 62 respondents chose to wash their hands only when they feel it is dirty.



*Figure 13 Hands Cleaning Option*

***The mode of hands cleaning option is Hand Wash with a frequency of 53.***

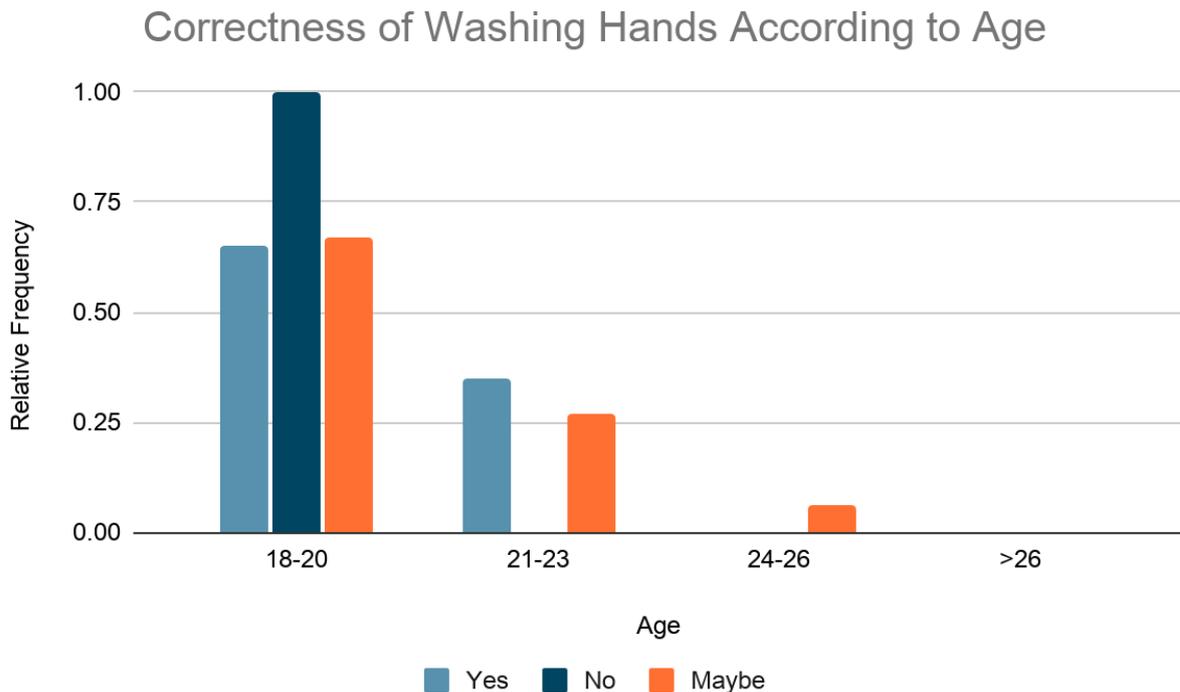
Figure 13 illustrates that for the hand cleaning option out of 62 respondents, hand wash recorded the highest frequency which is 53 and followed by water (52) which is slightly lower than hand wash. Hand sanitizer placed as the third-highest option used to clean the hands which 28 respondents chose it. In addition, only 19 respondents chose soap as one of their options to clean their hands. Lastly, only 1 respondent chose another option which is a wet towel as their option to clean their hands.



*Figure 14 Habits of Washing Hands before eating*

***The mode for The Habits of Washing Hands before eating is the Yes Option with a percentage of 79%.***

The pie chart plotted above illustrates that most of the respondents have a habit of washing their hands before eating with a percentage frequency of 79%, followed by the respondents choosing the option 'No' (4.8%) and 'Sometimes' (16.1%) for the question.



*Figure 15 Correctness of Washing Hands According to Age*

***The mode for respondents who know the correct way to their hands is 0.65 (65%).***

***The mode for respondents who do not know the correct way to their hands is 1.00 (100%).***

***The mode for respondents who are unsure of the correct way to their hands is 0.67 (67%).***

Figure 15 shows that all of the respondents that do not know the correct way to wash hands are aged 18 to 20 which took 1.00 as the relative frequency. On the other hand, 0.65 and 0.35 of the respondents that know the correct way to wash their hands are aged 18 to 20 and 21 to 23 respectively. There are 0.67 who are unsure of the correct way and are aged 18 to 20. Meanwhile, respondents aged 21 to 23 and 24 to 26 have 0.27 and 0.06 respectively chose ‘maybe’ as their answers to the question.

Recommended hand washing duration (seconds)	Frequency	Midpoint	Cumulative Frequency
0-20	8	10	8
20-40	29	30	37
40-60	18	50	55
>60	7	70	62
Total	62		

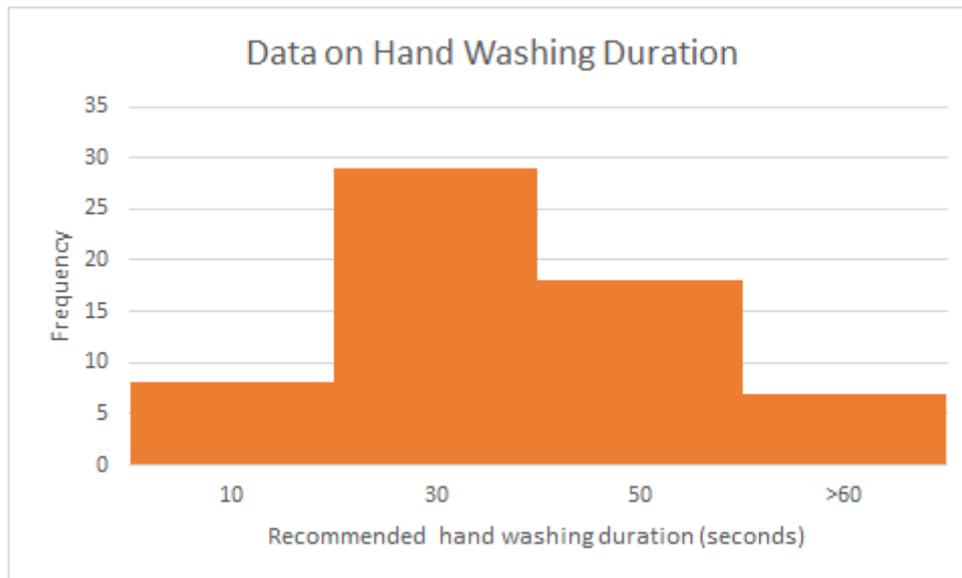
$$\begin{aligned}
 \text{Mean, } \bar{x} &= \frac{\sum_{i=1}^n X_i}{n} \\
 &= \frac{41(19)+20(22)+1(25)+0(27)}{62} \\
 &= \frac{1244}{62} \\
 &= 20.06
 \end{aligned}$$

$$\begin{aligned}
 \text{Median class} &= 62/2 \\
 &= 31^{\text{th}} \\
 &= 18-20
 \end{aligned}$$

$$\begin{aligned}
 \text{Median} &= L + \frac{\frac{N}{2} - cf_p}{f_{med}} (W) \\
 &= 18 + \frac{\frac{62}{2} - 0}{41} (2) \\
 &= 19.51
 \end{aligned}$$

$$\text{Modal class} = 18-20$$

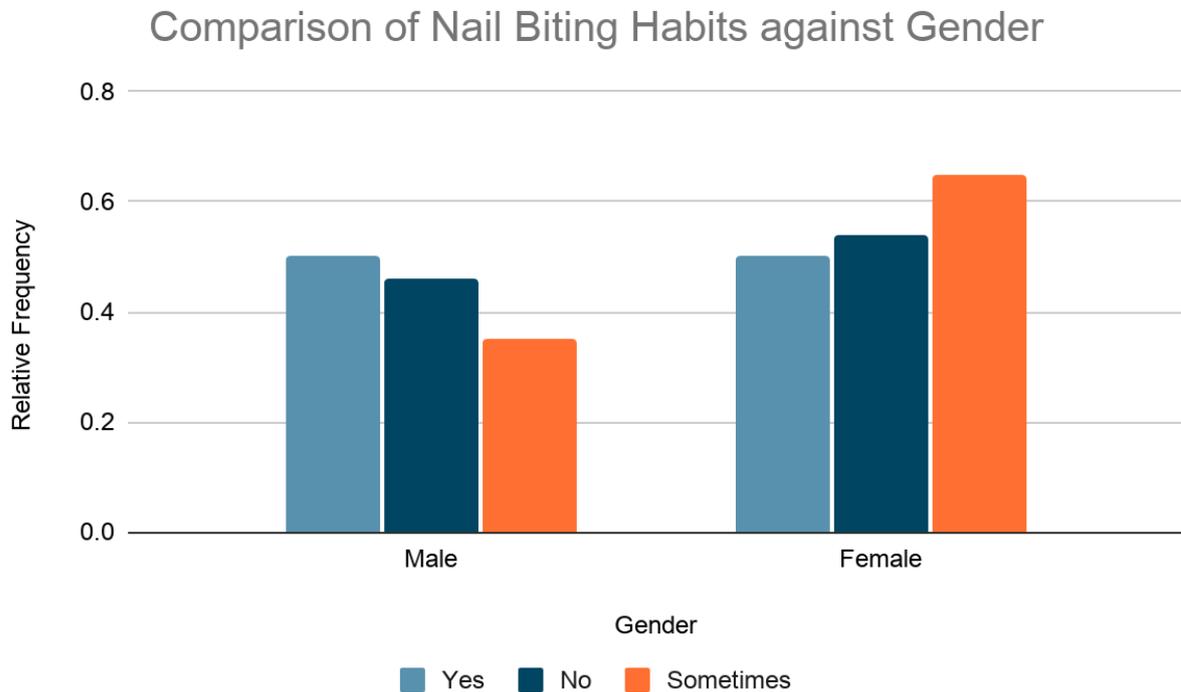
$$\begin{aligned}
 \text{Mode} &= l + h \left( \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \right) \\
 &= 18 + 2 \left( \frac{41 - 0}{2(41) - 0 - 20} \right) \\
 &= 19.32
 \end{aligned}$$



*Figure 16 Data on Hand Washing Duration (seconds)*

The histogram above shows that most of the respondents (29) think that the recommended hand washing duration is between 20 to 40 seconds. On the other hand, 18 respondents think that the recommended hand washing duration is between 40 to 60 seconds. Moreover, 8 respondents think that the recommended hand washing duration is between 0 to 20 seconds and followed by 7 respondents who think that the recommended hand washing duration is more than 60 seconds.

## e) Nail Hygiene

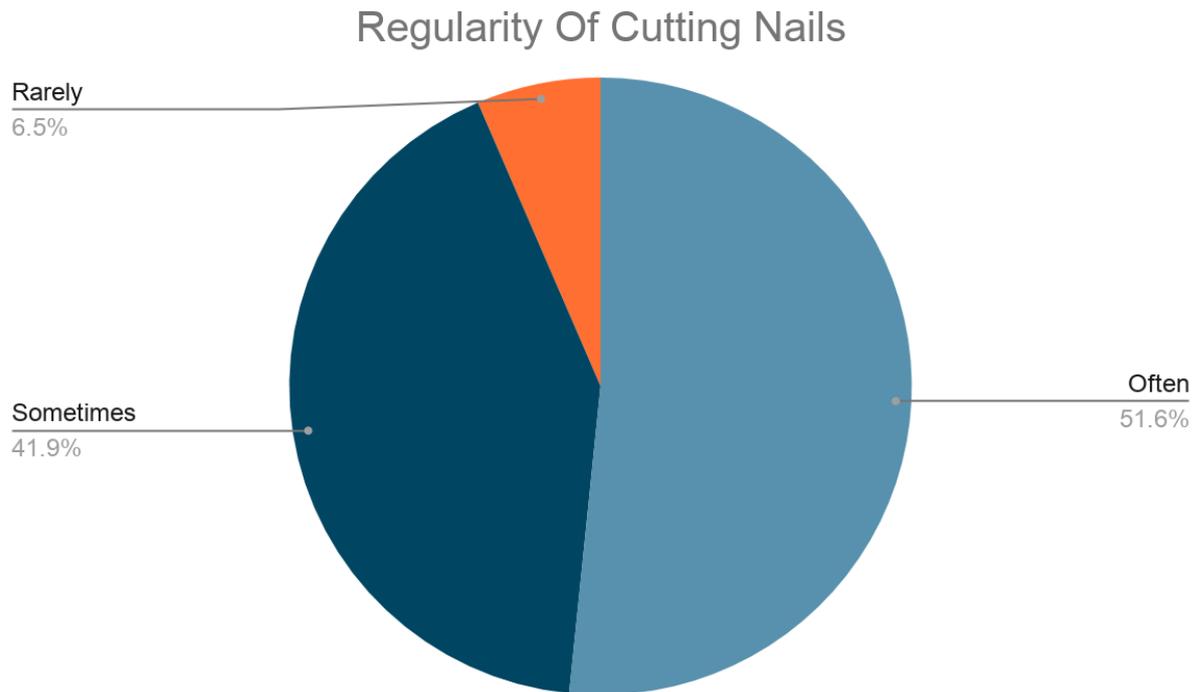


*Figure 17 Nail Biting Habits based on Gender*

***The mode for male respondents is 0.50 (50%).***

***The mode for female respondents is 0.65 (65%).***

According to Figure 17, it shows that there is the same relative frequency (0.50) for both male and female respondents that have nail-biting habits. On the other hand, there are more female respondents who do not have a nail-biting habit compared to male respondents with a relative frequency of 0.54 (54%) and 0.46 (46%) respectively. Besides that, there are also more female respondents who ‘sometimes’ have nail-biting habits compared to male respondents with a relative frequency of 0.65 (65%) and 0.35 (35%) respectively. Figure 9, also shows that the graph of the male respondents is decreasing, however, the graph of female respondents is increasing. Thus, we can conclude that female respondents have better nail hygiene compared to male respondents.

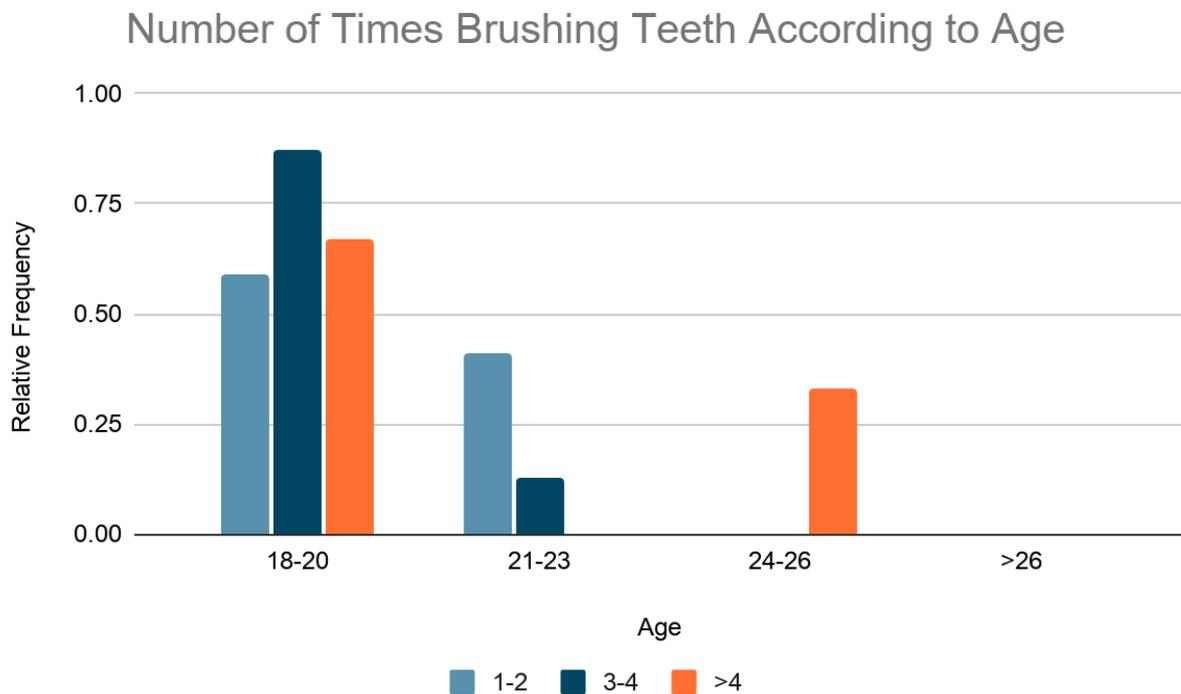


*Figure 18 Regularity of Cutting Nails*

***The mode for the Regularity of Cutting Nails is the Often option with a percentage of 51.6%.***

As we can see from Figure 18, 51.6% of the respondents often cut their nails. Compared to respondents who chose 'Sometimes', there are only 41.9% of the respondents. Moreover, 6.5% of the respondents rarely cut their nails.

## f) Teeth Hygiene



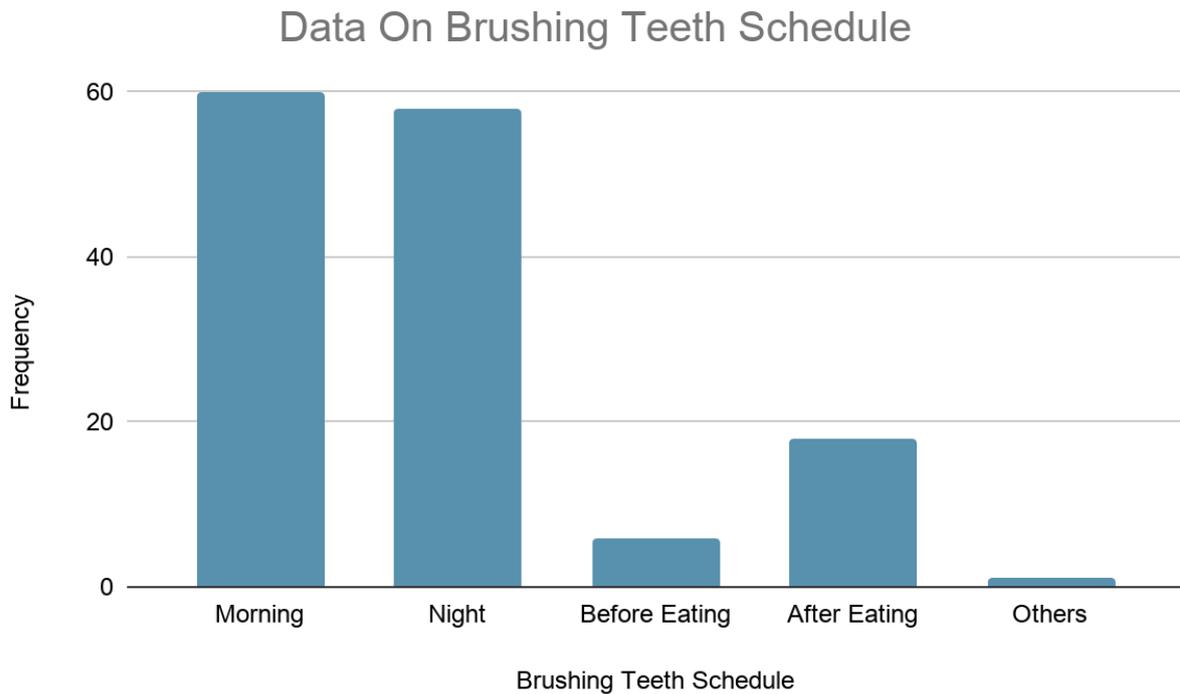
*Figure 19 Number of Times Brushing Teeth According to Age*

***The mode for brushing teeth 1-2 times is 0.59 (59%).***

***The mode for brushing teeth 3-4 times is 0.87 (87%).***

***The mode for brushing teeth more than 4 times is 0.67 (67%).***

Figure 19 illustrates that the age between 18-20, 0.87 of the respondents brush their teeth around 3 to 4 times while 0.59 and 0.67 of the respondents brush their teeth 1 to 2 times and more than 4 times respectively. Meanwhile, 0.41 of the respondents aged between 21 to 23 will brush their teeth 1 to 2 times only and 0.13 of the respondents with the same age range brush their teeth 3 to 4 times. There are no respondents of age 21 to 23 that brush their teeth more than 4 times. Lastly, only 0.33 of the respondents aged 24 to 26 years old brush their teeth more than 4 times.



*Figure 20 Data on Brushing Teeth Schedule*

***The mode for the Brushing Teeth Schedule is in the Morning with a frequency of 60.***

The Bar Chart plotted above illustrates that the highest frequency of respondents brushing their teeth is in the morning with a frequency of 60 over 62. In contrast, 58 over 62 respondents brushed their teeth at night. Next, 18 over 62 respondents will brush their teeth after having a meal. Furthermore, 6 over 62 respondents will brush their teeth before taking a meal. Moreover, 1 over 62 respondents choose the ‘other’ option to answer this question.

## **CONCLUSION**

Throughout this entire study, we have indeed had a better insight into the hygiene care of university students. Within the 62 respondents of Universiti Teknologi Malaysia (UTM), we can conclude the majority of the students are well aware of the different categories in personal hygiene care. Next, more than half of the respondents agree that wearing a mask will improve hygiene. Besides, students between 18-23 years old prefer to shower once or twice a day with a duration of 11-20 minutes. However, a third of the respondents do not use loofahs (body scrubber) while showering. Meanwhile, another one of the third uses loofahs and the rest use it occasionally. From this, we can conclude that several students do not understand the importance of loofahs to clean their skin from the dead skin cells and dirt. The majority of students tend to prefer mainstream brands such as Dettol, Lux and Lifebuoy which are easy to get and affordable.

In hand hygiene, the conclusion can be made that majority of students wash their hand frequently using hand wash and water followed by hand sanitizer. Besides, with a frequency of 29 out of 62 respondents answering correctly on the duration of had wash is 20-40 seconds, we can conclude that more than 50% are unaware of the ideal duration to wash their hand to get rid of unwanted bacteria and dirt. We can assume that students realize the importance of keeping the hands clean but are unsure of the right duration. Based on the nail hygiene survey, the relative frequency of the graph has proven that female has better nail hygiene compared to male. Furthermore, the majority of the students brush their teeth once or twice a day, which is during the day and night. With all the data analysis made, we can finally conclude that students do have good hygiene care. However, there are some areas where importance needs to be given such as the importance of using loofahs, brushing teeth 3-4 times a day and washing hands within 20-40 seconds.

In a nutshell, UTM students do give importance to personal hygiene and are well aware of their hygiene care but improvements should be made for better care for themselves for a healthier life.

Throughout this project, we have understood how analysis is done systematically with all the data obtained. Alongside that, we have learned to utilize Microsoft Excel and Microsoft Word for data storage and plotting different graphs, such as histograms, bar chart and pie chart to distinguish the data visually. This has allowed us to complete our data analysis much easier.

## **APPENDIX**

Google form used to conduct the survey:

<https://docs.google.com/forms/d/1GYixWo0PoCXqK8Z4LXnogISPP7MUqiZzvKTtyNh250k/edit?usp=sharing>

Spreadsheet of data:

<https://docs.google.com/spreadsheets/d/1duveB9VZZsphhEm40bUpvSMCeJBOYnhIbE39NPMAfDw/edit#gid=414903027>