

Master of Science in Public Health



**Association of Breakfast Eating Habits with  
Cognitive Functions among Nursing Students of  
Rawalpindi and Islamabad**

**By**

**(Yaqoob Bashir)**

**Al-Shifa School of Public Health, PIO,  
Al Shifa Trust Eye Hospital  
Quaid-i-Azam University  
Islamabad, Pakistan**

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***(Association of Breakfast Eating Habit with Cognitive Functions among Nursing Students of Rawalpindi and Islamabad)***

(Yaqoob Bashir)

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This dissertation is the result of an independent investigation. Where my work is indebted to others, I have made acknowledgments.

I declare that this work has not been accepted in substance for any other degree, nor is it currently being submitted in candidature for any other degree.

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**(Dr. Ayesha Babar Kawish)**  
**Head of Department**  
Al-Shifa School of Public Health  
PIO, Al Shifa Trust Eye Hospital  
Date:

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**(Yaqoob Bashir)**  
Quaid-I-Azam University  
362864-PIO/MSPH-2021  
MSPH (2023)  
Date:

*This thesis is dedicated to my beloved mother, my wife  
and my kids Dawood and Daim .....*

## ABSTRACT

**Background:** Breakfast is an important meal of the day that is essential to provide required nutrients and energy for the daily activities. Cognitive functioning of a person can be greatly affected by the intake of breakfast. Healthy and regular intake of breakfast is essential for cognitive development, mental functioning and physical strength of the individual.

**Objectives:** This study was carried out to determine the breakfast eating patterns of nursing students as well as their cognitive functioning. Moreover, association between breakfast eating habits and cognitive functioning was also determined.

**Methodology:** It was a cross-sectional study, carried out at nursing school of Rawalpindi and Islamabad. A total of 400 nursing students were selected through simple random sampling. Mood, Positive Affect and Negative Affect Scale (PANAS) and Attention, two minutes' test were used to determine the cognitive function of the respondents. Pearson Chi-Square test was applied to examine the association of cognitive function with breakfast eating habits. P value less than 0.05 was taken as significant.

**Results:** More than half of the study population consisted of female students (n= 256, 64%), nearly 87% students (n= 351) lies within 16-25 years of age group. It was found that 69% respondents (n= 278) reported occasionally taking healthy food while 14% students (n= 54) reported repeatedly taking unhealthy meals. Nearly 77% respondents (n= 309) reported moderate levels of breakfast eating habits; neither good nor bad. Majority of the respondents reported a moderate level of cognitive function (n= 287, 72%). A significant association was found between cognitive function and breakfast eating habits, number of siblings, BMI, and year of study (p value<0.05).

**Conclusion:** It was found that good breakfast eating habits can help to improve cognitive function of students. Moreover, respondents reported moderate levels of cognitive functioning and moderate levels of breakfast eating habits.

**Keywords:** Breakfast, Cognitive function, Healthy eating, Islamabad, Nursing students, Rawalpindi.

## **ACKNOWLEDGMENTS**

### **In the name of Allah, the most Merciful and Beneficent**

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## List of Abbreviations

|       |   |
|-------|---|
| BMI   | Body Mass Index                               |
| IRB   | Institutional Review Board                    |
| LID   | Law Inside dictionary                         |
| MUAC  | Mid Upper Arm Circumference                   |
| NCBI  | National Center for Biotechnology Information |
| NLM   | National Library of Medicine                  |
| PANAS | Positive Affect and Negative Affect Scale     |
| RTECs | Ready to Eat Cereals                          |
| SPSS  | Statistical Package for Social Sciences       |
| VAD   | Vitamin A Deficiency                          |

## CHAPTER I: INTRODUCTION

As the first meal of the day, breakfast plays an important role in supplying energy and nutrients, which are critical to working and learning activities. Regular consumption of breakfast is associated of improved cognitive functions in nursing students. Despite breakfast's positive attributes, many nursing students go to nursing college without breakfast. Cognitive function and memory improve as a result of people having breakfast (Reni et al., 2017). When people eat breakfast, things like concentration, memory, and energy all improve, making them more alert as well (Jaapna et al., 2017).

An adequate breakfast can reduce the risk of diabetes, osteoporosis, obesity, cerebrovascular disease and other chronic diseases. People who eat breakfast every day have a 35 to 50% lower risk of obesity and diabetes (Masato et al., 2021).

Glucose is the main fuel for brain function and optimal cognitive function requires the maintenance of a stable blood glucose level (Michael et al., 2018). Breakfast has a direct effect on blood glucose levels and in turn blood glucose levels have a direct effect on cognitive function. Skipping breakfast lower's cognitive function and work efficiency (Weronika et al., 2019). Daily breakfast consumption has a variety of positive effects on psychosocial and health behavior's, including increased levels of physical activity and memory recall as well as enhanced cognitive function (Dorothee et al., 2015).

Eating breakfast will provide schoolchildren with a quarter to a third of their suggested daily energy desires. Schoolchildren gain almost half their weight and bone structure

during this period of growth, and 15–20% of their adult height. A healthy breakfast habit is linked with improving an individual's general nutritional status (ALBashtawy, 2017). Breakfast eating habit has been verified to strengthen scholastic accomplishment as well as being vital in developing a wholesome positive lifestyle. Breakfast increases glucose levels which in return can lead to improved memory, immediate recall, attention span, and subsequently to improved test grades (Peter R. Reuter, 2021). Adult students transitioning from schools to universities experience complications following to healthy eating habits due to lack of time and stressors and instead they skip meals, eat unhealthy snacks, dine out, and consume fast food. The stress of university life and medical studies negatively disturbs their dietary patterns (Kelishadi et al., 2017).

Most developing countries have experienced nutrition transition, which is characterized by marked socio-economic transformation over the past decades. Such transition has led to great changes in food consumption and lifestyle patterns (Abdulrahman O. Musaiger, 2016). Nutrition has a documented role for cognitive development, however, there is paucity of literature regarding this connection at national level.

By filling this gap in the literature, this study was intended to advance current research on the connection between breakfast and cognitive functioning. In order to determine whether regular breakfast consumption has an effect on cognitive function and whether the makeup of the breakfast has an impact on cognitive performance.

### **1.1. Objectives:**

1. To assess the breakfast eating habits among nursing students of Rawalpindi & Islamabad.
2. To measure the cognitive functions of nursing students of Rawalpindi & Islamabad.
3. To find out association between breakfast eating habits and cognitive functions among nursing students.

## **CHAPTER II: LITERATURE REVIEW**

### **2.1. Context of study:**

#### **2.1.1. World-wide Burden:**

Type 2 diabetes is one of the world's most predominant, costly and fatal chronic conditions. As of 2013, approximately 382 million people worldwide had the disease, with 175 million cases undiagnosed. These cases occurred at disproportionate levels in low- and middle-income countries (LMIC). Two main factors have been projected as major reasons for the fast increase in diabetes worldwide, (I) an epidemiologic evolution where communicable diseases have decreased as the major causes of death and (II) a simultaneous nutrition transition characterized by increasingly unhealthy dietary habits, combined with lower levels of physical activity (Josiemer et al., 20150).

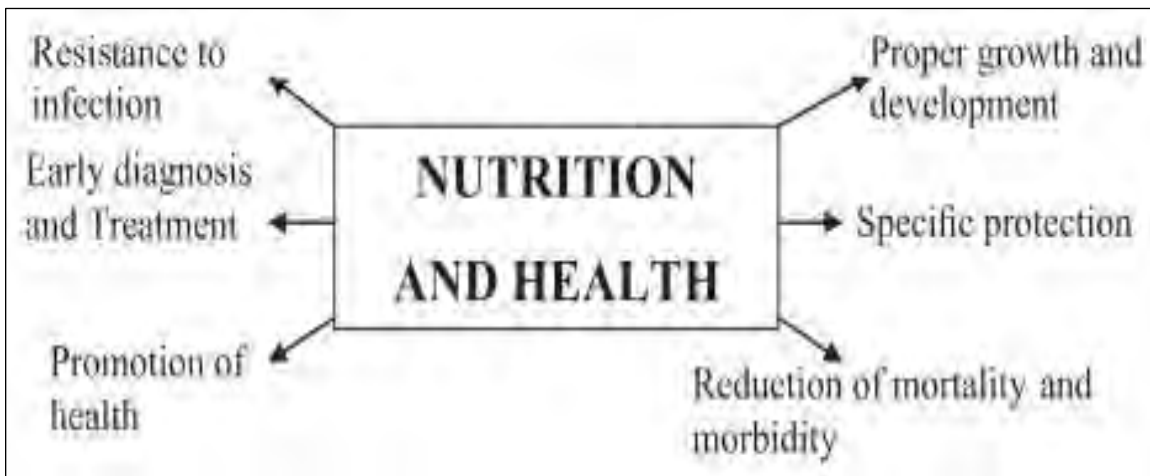
#### **2.1.2. Burden of breakfast-eating habits in Pakistan:**

The increasing burden of lifestyle diseases (diabetes type 2, hypertension, stroke, asthma, COPD) can be controlled by adopting a harmony between healthy lifestyle and taking highly nutritious balanced diet. Since the current generation of medical students is the part of future defenders of health care system, so it is necessary to make awareness that commencement of these life-threatening diseases can be stopped or delayed by maintaining health in good condition.



## 2.2. Role of nutrition in health:

A healthy breakfast has positive paraphernalia on providing school-age children with vital nutrients for their activities and long-term health throughout life. Skipping breakfast, many health problems, cognitive and psychosocial function in addition to poor performance could negatively affect learning and academic success. Children who skip breakfast have trouble concentrating in the afternoon and feel tired at the end of the day due to reduced energy levels (Dean et al., 2012).



**Figure 1: Role of Nutrition in Health (Dean et al., 2012)**

### 2.2.1. Malnutrition:

According to the World Health Organization (WHO), malnutrition is a cellular disparity that arises between the body's supply of nutrient and energy sources and the physical demand for these components. This inequity can reduce the body's ability to grow and keep suitable operation of various bodily functions. As a result, malnutrition can lead to a negotiated health condition and increase an individual's risk of several different health

conditions. Malnutrition can be more classified into two broad forms of which include undernutrition and micronutrient-related malnutrition (Eqbal et al., 2020).

**1. Undernutrition:**

Wasting, stunting, underweight and deficiencies in vitamins and minerals are the most common forms of undernutrition. Deficiencies in vitamin A, iron, iodine and zinc are some of the most common outcomes of undernutrition, Vitamin A deficiency (VAD). While stunting is often linked with poor socioeconomic conditions, poor maternal health and nutrition, common illness and/or undernutrition in infants and young children.

**2. Micronutrient related nutrition:**

It is currently estimated that 2.3 billion children and adults are overweight in the world. An obese individual may not seem to be malnourished, they often lack a diet that is rich in fruits, vegetables, whole grains and beans all of which are essential to uphold a satisfactory nutritional status.

**2.3. Breakfast feeding habits:**

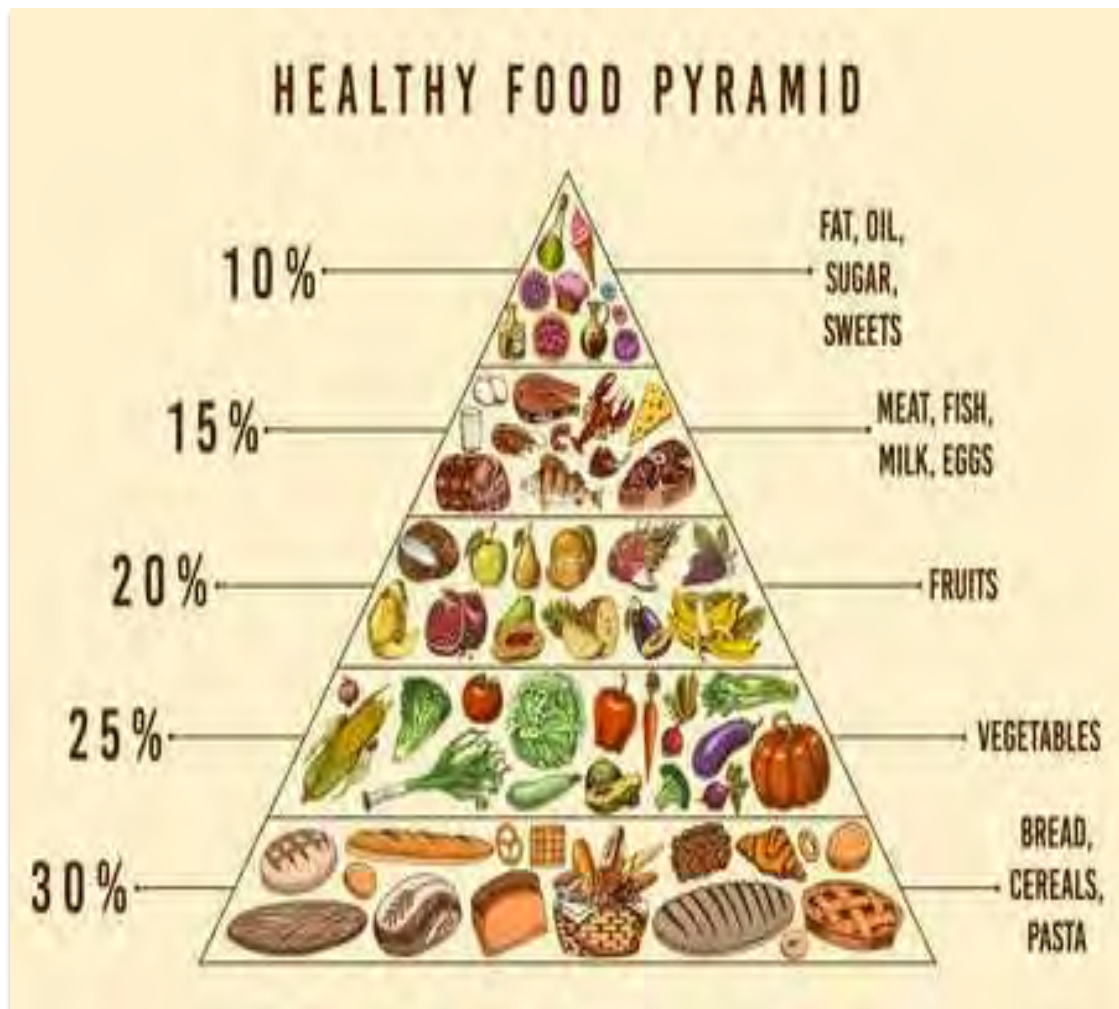
Breakfast literally means “to break the fast.” It is the first meal of the day after a stretch of not eating overnight. Eating regular meals and snacks including breakfast permits for more opportunities throughout the day to give the body energy and nutrients it needs to function optimally. Eating breakfast and listening to hunger cues is very important if wake up hungry in the morning (Silvia et al., 2015).

### 2.3.1. Breakfast Significant Figure:



## 2.4. Balance Diet:

A healthy balanced diet should contain different vegetables and fruits every day, starchy food with higher fiber like bread, dairy products or their alternatives, proteins such as meat, fish, beans, or eggs, small amounts of unsaturated fats and about 6 to 8 glasses of fluids.



## **2.5. Requirements of energy in nursing job:**

Energy is required for clinical nurses to perform their job well. The nursing profession is tough physically, emotionally and mentally. In almost every working scenario, nurses work long hours while undertaking stressful communications with sick patients and their families. Nursing usually necessitates shift work, which entails early mornings, night shifts, on-call requirements and overtime. On average, nurses burned 2.12kcal/minute while at work. Almost 2000-2200 calories per-day are required for the nursing job.

## **2.6. International Research Studies on Breakfast Eating Habits:**

Walid et al., conducted research in 2015 in Finland. The aim of the study was poor eating habits among young adults. It was a survey-based study and 1198 university students were selected for this research. In the study it was observed that high levels of dietary adherence (>70%) for most of the 'unhealthy food' items (cake/cookies, snacks, fast food/canned food, and lemonade/soft drinks) and modest adherence for most of the 'healthy food' items (>50%) (dairy/dairy products, fruit/vegetables servings/day, fresh fruit, salads/raw vegetables and cereal/cereal products). Fish/seafood, meat/sausage products and cooked vegetables had levels <50% for adherence to the guidelines. Women had better adherence for meat/sausage products, fast food/canned food and for most 'healthy food' items ( $p \leq 0.001$ ), whereas men had better adherence for sweets (difference=12.8%,  $p \leq 0.001$ ), lemonade/soft drinks (difference=16.7%,  $p \leq 0.001$ ) and fish/seafood (difference=6.6%,  $p = 0.040$ ) compared to women. Most students considered

important to eat healthy (78.8%). The importance of eating healthy was significantly associated with adherence for all food groups besides sweets and cake/cookies. These associations remained significant for women but some of them not for men (cereal/cereal products, snacks and sweets) (Walid El Ansari, 2015).

Giovanni et al., carried out research in 2018 in Italy. The purpose of this study was to use a qualitative research design to analyze the factors (barriers and enablers) that US college students perceived as influencing healthy eating behaviors. The total of 35 university students participated in this study. A qualitative software, CAQDAS Nvivo11 Plus was used to create codes that categorized the group discussions while using an Ecological Model. Common barriers to healthy eating were time constraints, unhealthy snacking, convenience high-calorie food, high prices of healthy food, and easy access to junk food. The findings of the study showed that enablers to healthy behavior were improved food knowledge and education, meal planning, involvement in food preparation and being physically active. Parental food behavior and friends' social pressure were considered to have both positive and negative influences on individual eating habits (Giovanni et al., 2018).

Sam et al., conducted research in 2018 in USA. It was a cross-sectional study. The purpose of this study was to examine college students eating habits and knowledge of nutritional requirements for health. The total of 121 participants were selected for this study. The results of the study showed that the students were well-informed that consuming fast food, soda and processed food are unhealthy and they hold essences. They

showed strong promise to keep themselves hydrated and choosing food because of taste preference. Although majority were self-confessed eating fresh fruits, a significant number consume processed food such as chips, cookies, and cereal based on opportuneness. Smartphone resources, vending machine use, and drinking soda were their least frequently used habits (Sam et al., 2018).

Jose et al., conducted research in 2021 in Spain. It was a cross-sectional study. The aim of the study was to explore the influence of an enrolled degree course on health and eating habits in a population of Spanish university students (17–26 y of age). The total 648 students were selected for this study. The results of the study showed that self-reported body mass index was higher for the non-biomedical group ( $P < 0.05$ ), which also reported less regularity in taking meals ( $P < 0.05$ ), eating fewer colored vegetables and fruits ( $P < 0.001$ ) and a higher alcohol intake ( $P < 0.001$ ). In contrast, the proportion of students that showed more interest in the diet–health duality ( $P < 0.001$ ) and a desire to adopt healthier habits ( $P < 0.05$ ) was larger in the biomedical group. Dietary habits, obtained by means of a food frequency questionnaire, proposed that biomedical students make healthier food choices. Moreover, the group of biomedical students took more walks per week ( $P < 0.05$ ) (Jose et al, 2021).

Paulo et al., carried out research in 2017 in Brazil. It was a cross-sectional study. The main objective of the study was determining the association between meal habits and diet quality in Brazilian adolescents. Out of total, 1139 students were selected for this study. The findings of the study showed that meal profile was positively linked with diet quality.



Daily consumption of breakfast was associated with higher BHEI-R scores, lower sodium intake, and greater consumption of fruits and milk/dairy. Daily consumption of lunch was related with greater consumption of vegetables and “meats, eggs, and legumes.”. However, consumption of dinner was associated with an increased consumption of “whole fruits” (Paulo et al., 2017).

Marianna et al., conducted research in 2015 in Finland. It was a cross-sectional study. The total 23182 participants were selected for this study. The aim of the study was to examine the association between proximity of fast-food outlet or grocery stores near schools and adolescents eating habits and overweight. The results of the study showed that 13% of the participants were overweight. Having a fast-food outlet or grocery store near school was related with skipping often breakfast and free school lunch and the accumulation of irregular eating habits. The proximity of a fast-food outlet or grocery store was associated with a 1.25-fold risk of overweight among adolescent with a low socioeconomic status but not among those with higher socioeconomic status (Marianna et al., 2015).

Mohammad H. Al-Qahtani conducted research in 2016 in Saudi Arabia. This was a cross-sectional study. The aim of the study was to evaluate the dietary habits and life style of medical students. Out of total 562 students participated in this study. The results of the study showed that the majority of the students were consuming fast foods, 85% males do it 3 times or more per week, only 8.7% denied eating fast food. Majority of students are aware of the benefits of the vegetables and fruits and the disadvantage of the soft drinks



yet most of them consume a lot of soft drinks and less of vegetables and fruits. Physical exercise was not done regularly in 65% of the male medical students and 80% of the female with almost similar percentage in all the three levels (Al-Qahtani, 2016).

Najat et al., carried out research in 2016 in USA. It was a cross-sectional survey. The objective of the study was to assess weight status, dietary habits, physical activity, dietary beliefs, and nutrition knowledge among a sample of students. Out of total 237 students were selected for the study. The findings of the study showed that 78% of female students were within the healthy weight range compared to 52% of male students. Visceral body fat and waist circumference scores were higher in males than in females. Most students showed 'satisfactory' dietary habits. Almost half of the students reported drinking two glasses of milk and consuming two cups of fruits and vegetables daily. Physical activity and lifestyle score indicated that most of the students were not physically active. Only 7% of students reported having a very active lifestyle, and 4% had quite good nutritional knowledge (Najat et al., 2016).

Hui et al., carried out research in 2015 in Kuala Lumpur. It was a cross-sectional study. This study was aimed to investigate the breakfast eating pattern and ready-to-eat-cereals (RTECs) consumption among schoolchildren. Out of total 382 schoolchildren, aged 10 and 11 years old were recruited from seven randomly selected primary schools. The results of the study showed that only 22% of the students consumed breakfast on a regular basis. The most commonly eaten food by children at breakfast was bread (27.2%), biscuits (22.2%) and RTECs (20.5%). The majority of them reported that they consumed RTECs

sometimes during the week. Chocolate RTECs (34.1%), corn flake RTECs (30.3%), and RTECs coated with honey (25.1%) were the most popular RTECs chosen by children. Respondents who consumed RTECs showed a significantly higher intake in calories, carbohydrate, vitamin A, vitamin B1, vitamin B2, vitamin B3, folate, vitamin C, calcium, iron and fiber ( $P < 0.05$ ), compared to those who skipped breakfast and those who had breakfast foods other than RTECs (Hui et al., 2015).

Kingsley and Vivian carried out research in 2018 in Nigeria. The aim of the study was to assess the dietary pattern and nutritional status of undergraduate students. It was a cross-sectional study. Out of total 800 undergraduate students selected by multistage sampling. Data were collected using pretested, structured self-administered questionnaires and anthropometric measurements were obtained. The results of the study showed that half of the respondents (56.0%) skipped breakfast and (76.0%) ate in between meals. More females (59.8%) compared to males (50.6%) skipped breakfast and the association between gender of respondents and breakfast skipping was statistically significant ( $p < 0.010$ ). Majority of the respondents ate snacks and the association between age group and snacking status of respondents was statistically significant ( $p < 0.034$ ). Out of total (49.0%) of the respondents had high dietary diversity score while (26.5%) had low dietary diversity score. The association between age group and dietary diversity was statistically significant (Kingsley & Vivian, 2018).

## **2.7. National Research Studies on Breakfast Eating Habits:**

Naveed et al., carried out research in 2018 in Lahore. It was a cross-sectional descriptive study. The main objective of the study was to assess the dietary habits, nutritional status and their association in young adolescent female medical students. A total of 114 female students from 1st year and 2nd year were selected. Their socio-demographic characteristics, dietary habits and nutritional status were calculated through a questionnaire. Hemoglobin levels were measured by “Sysmex” while mid upper arm circumference and (MUAC) and body mass index (BMI) were measured with the help of measuring tape and weighing machine, respectively. The results of the study showed that out of total, 108 students were liked traditional food, and 84 had a habit of daily breakfast intake. Mostly students were consuming fast/junk food while 81 of the students used to take meat and meat products three times a week. A total of 42 students were underweight while 41 were anemic. Positive association was found between eating habits and hemoglobin levels ( $p = 0.001$ ). Relationship between regular intake of breakfast with BMI and MUAC was also positive ( $p = 0.003$  and  $0.02$ , respectively) (Naveed et al., 2018).

Ahmad et al., carried out research in 2021 in Pakistan. A web-based survey was conducted to gather information. Descriptive statistics, chi-square test, and multiple logistic regression were used for data analysis. The findings of the study showed that healthy changes in dietary habits including decreased consumption of fast foods, soft and cola drinks, fruit drinks, cooked meat (outside the home), sugar, and fats were associated with increased knowledge of COVID-19. Vitamin C and immunity-boosting supplement

consumption were significantly associated with increased knowledge regarding COVID-19 ( $< 0.05$ ) (Ahmad et al., 2021).

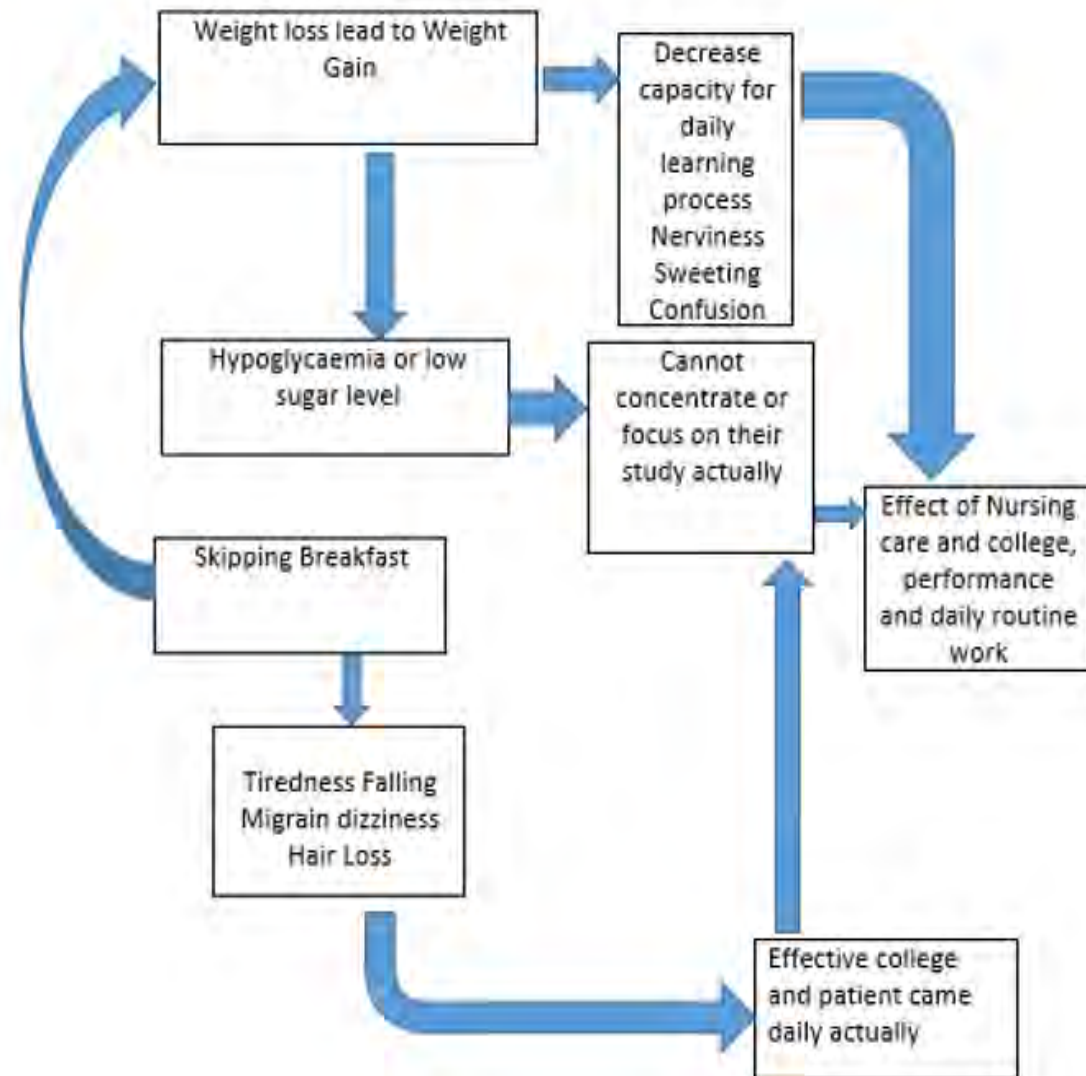
Nadeem and Umair conducted research in 2014 in Pakistan. It was a cross-sectional study. The aim of the study was to find out the breakfast habits on the academic performance of university students. Malty stage sampling technique was used for the collection of data. A sample of 240 respondents was taken from 16 departments of 7 faculties, while 15 students were taken from each department. Data were collected through simple random and convenient sampling. The findings of the study showed that most of the students skip their breakfast and consumed less fruits, fish, lettuce and soup. It is also found that there was highly association between breakfast habits and education performance the students who consumed less food feel laziness and inactive during study they can't focus on the study. A majority of the respondents don't take breakfast often while most of the students missed one-time meal often that become the cause of brain damage and makes the student cognitive level low. That becomes the cause of obtained low grades in education (Nadeem & Umair, 2014).

Sidra and Mahira conducted research in 2021 in Lahore. It was a descriptive survey. The major objective of the study was to find out the breakfast eating habits among undergraduate students of diet and nutrition. A total of 100 female students were sampled using a convenience sample method. Informed consents were taken prior to collection of data. A self-administered questionnaire was developed and used to obtain information. The results of the study showed that out of 100 students 46% eat breakfast daily and 54%

did not take breakfast on daily basis. 41% of the respondents showed that they give time gap of 5 hours between their breakfast and lunch. Whereas, 32% students said they give 6 hours, 14% responded they give 7 hours and 13% students responded they give 8 hours gap between their breakfast and lunch. In addition, 75% of the respondents said they take snack(s) between breakfast and lunch while 25% said they don't take snack in between (Sidra & Mahira, 2021).

Ayesha et al., conducted research in 2018 in Sindh. It was a school-based survey. The aim of the study was to describes the dietary practices of school children across eight districts of Sindh. Out of total 1109 students from classes 2–5 in 36 schools were selected using a pre-tested interviewer-completed questionnaire. The findings of the study showed that more than 75% school children ate breakfast, lunch and dinner regularly. Though, 10% children skipped breakfast and nearly one-third of them skipped mid-morning and evening snacks. Skipping breakfast and snacks was related to low socio-economic status and rural residence. Children's consumption of protein-rich food items and fruits also showed that urban residence and better socio-economic status have a positive effect on the frequency and diversity of daily protein and fruit intake. Though affordability and geographic location were key determinants of children's dietary practices, significantly higher percentages of children studying in class 2, 3 and 4 consumed different kinds of protein-rich food items, fruits and vegetables more frequently as opposed to children studying in class 5. Junk food consumption was more common in urban areas and better socio-economic strata (Ayesha et al., 2018).

## 2.8. Conceptual Framework:



**Figure 2: Conceptual Framework for association of breakfast eating habit with cognitive functions among Nursing students of Rawalpindi & Islamabad**

## **2.9. Operational Definitions:**

### **Breakfast:**

“Breakfast is the first meal of the day that breaks the fast after the longest period of sleep. ((NCBI) National Center for Biotechnology Information) (Michael et al., 2018).

### **Eating habits:**

“Conscious, collective, and repetitive behaviors, which lead people to select, consume, and use certain foods or diets, in response to social and cultural influences”. ((NLM) National Library of Medicine) (Christian et al., 2020).

### **Nursing Students:**

Nursing student means an individual who is enrolled in a professional nursing or vocational nursing education program. ((LID) Law Inside dictionary).

### **Cognitive functions:**

Cognitive functioning refers to multiple mental abilities, including learning, thinking, reasoning, remembering, problem solving, decision making, and attention (Gwenith et al., 2019).

### **Malnutrition:**

Malnutrition is a cellular disparity that arises between the body’s supply of nutrient and energy sources and the physical demand for these components (Eqbal et al., 2020).

## **CHAPTER III: METHODOLOGY**

### **3.1 Study design**

A quantitative research approach using cross-sectional study design was used for the current study.

### **3.2. Study Duration:**

Study period for the current research was six months; August 2022-February 2023.

### **3.3. Study Setting:**

The present study was carried out at public sector nursing colleges of Rawalpindi and Islamabad.

### **3.4. Study Participants:**

Nursing students from the selected nursing colleges.

#### **3.4.1. Inclusion Criteria:**

1. Participants must be at least nineteen years old and above.
2. Nursing students from public sector colleges only.
3. Both male & female were included.
4. Volunteer



### **3.4.2. Exclusion Criteria:**

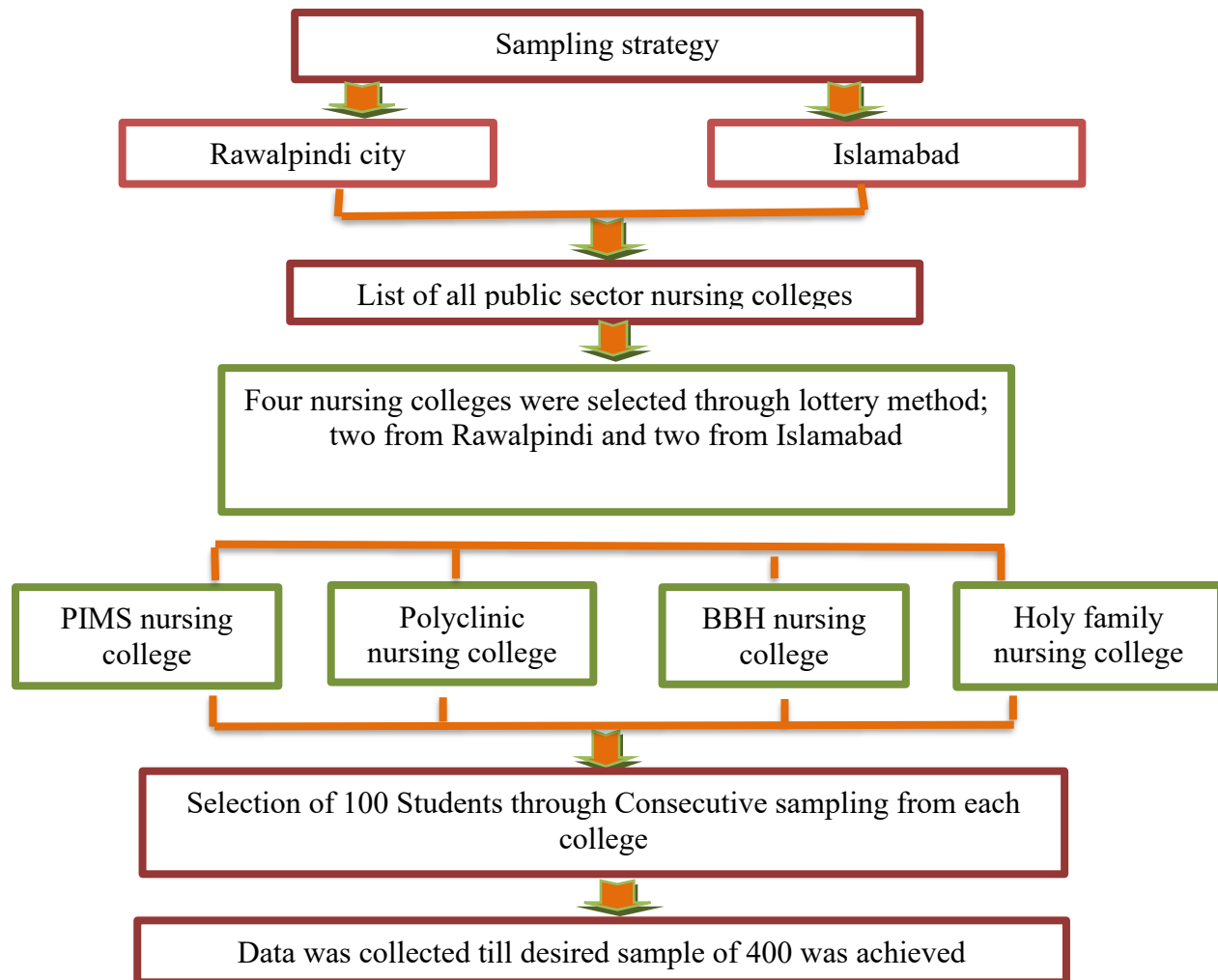
1. Students who were diagnosed with any kind of mental or physical disability.
2. Nursing students on leave were excluded.

### **3.5. Sample Size Calculation:**

The sample size was calculated using Open-Epi Menu software, by adding prevalence 50%, at 95% confidence interval and margin of error as 5%. The sample size for the current study was 400. Response rate was 100 %.

### **3.6. Sampling Strategy:**

Simple random sampling through lottery method was used to select four nursing colleges; two from Rawalpindi and two from Islamabad. Equal number of students were selected from all four colleges through non-probability consecutive sampling.



**Figure 3: Simple Random Sampling**

### 3.7. Data Collection Instrument:

#### 3.7.1. Questionnaire Design:

Data was collected using a self-administered questionnaire. A questionnaire was developed to collect data regarding sociodemographic characters of the nursing students, their breakfast eating habits, and cognitive functioning. Questions regarding breakfast eating habits were adapted from previous studies (Mahmod et al., 2017) while for measuring cognitive functioning, Attention, two minute test (Thomas, Rao & Devi, 2016) and Mood, Positive Affect and Negative Affect Scale (PANAS) (Tran, 2013) were used.

#### 3.7.2. Content of the Questionnaire:

The questionnaire consisted of three sections:

1. **First part** included questions related to sociodemographic characteristics of the students such as age, gender etc.
2. **Second part** included questions related to breakfast eating habits. It was further sub-divided into three sections;
  - a. *Eating healthy meal*; it included eight questions and a 5-point Likert scale ranging from 1= never to 5= repeatedly.
  - b. *Eating unhealthy meal*; it included thirteen questions and a 5-point Likert scale ranging from 1= never to 5= repeatedly.

- c. *Following healthy meal*; it included seven questions and a 5-point Likert scale ranging from 1= never to 5= repeatedly.
3. **Third part** included scales for measuring cognitive functioning of students. It was further divided into two sub-sections:
  - a. *Mood, Positive Affect and Negative Affect Scale (PANAS)*; it included 20 items and a 5-point Likert scale ranging from 1= very slightly/not at all to 5= extremely.
  - b. *Attention, two-minute test*; it included ten questions and a 4-point Likert scale ranging from 1= almost never to 4= always.

### **3.7.3. Study Variables:**

#### **3.7.3.1. Outcome Variable:**

Cognitive functioning of nursing students was out variable for the current study.

#### **3.7.3.2. Independent Variable:**

Breakfast eating habits and other sociodemographic variables such as age and gender of the students etc. were taken as independent variables.

### **3.8. Data Collection Process:**

#### **3.8.1. Pilot Testing:**

Pilot testing was performed before starting the formal data collection procedure by including 10% of the actual sample size. Questionnaire was tested for any future changes;

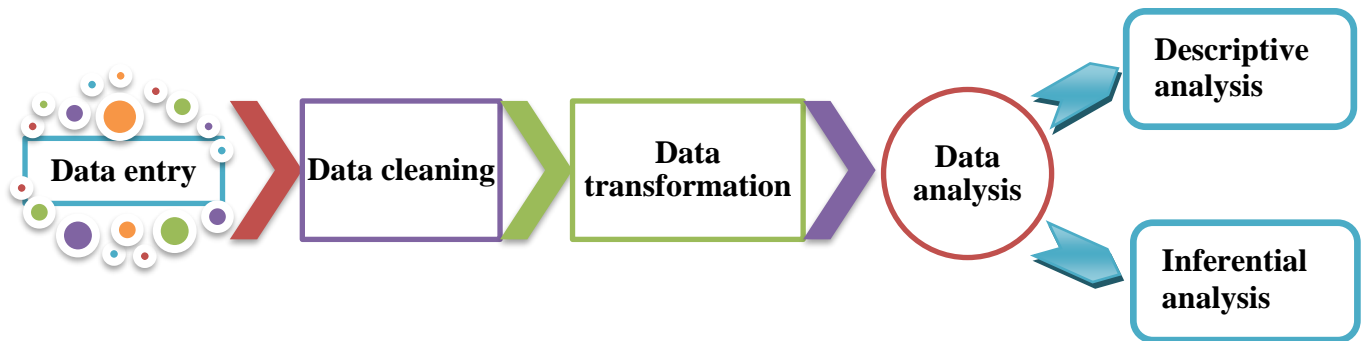
no major changes were done after pilot testing. Cronbach Alpha for questions related to breakfast eating habits was 0.68, for PANAS, the value of Cronbach alpha was 0.78 and for Attention two-minute test, the value of Cronbach Alpha was 0.66.

### **3.8.2. Data Collection:**

Nursing students were approached after taking permission from the college authorities. Written consent was taken from them before data collection and only those students were selected who agreed to take part in the research study and fulfill the inclusion criteria. After taking the consent, the questionnaires were self-administered to the students. Data collection was completed in approximately one and half month.

### **3.9. Data Analysis Procedure:**

Code book was developed and data was entered in Statistical Package for Social Sciences (SPSS) version 26. After careful data entry, data was checked for any error before proceeding to the further analysis. After data cleaning, data transformation was carried out for certain variables. Data analysis was done in two phases; descriptive analysis and inferential analysis (figure 3).



**Figure 4: Data Analysis Plan**

### **3.9.1. Data Cleaning:**

After careful data entry, data was checked for any missing values and any error that could possibly affect the further analysis. Double entries were eliminated before continuing the further analysis.

### **3.9.2. Data Transformation:**

Computed scores for cognitive functioning and breakfast eating habits were calculated for each respondent by adding the individual responses in SPSS. The computed variables were further categorized into sub-categories depending on their median value. Breakfast eating habits were categorized into poor (88-122), moderate (123-156) and good (157-190). While, cognitive function was divided into poor (14-21), moderate (22-29) and good (30-36).

### **3.9.3. Descriptive Analysis:**

Descriptive statistics were generated for sociodemographic characteristics and outcome variable. Categorical data was summarized in the form of frequencies and percentages and presented in tabular form, Bar chart and Pie chart.

### **3.9.4. Inferential Analysis:**

Pearson Chi-Square test of independence was used to find the association of breakfast eating habits and cognitive functioning among nursing students. Association of cognitive functioning of students was also determined with their sociodemographic characteristics. P-value less than 0.05 was considered statistically significant.

### **3.10. Ethical Considerations:**

Before starting formal data collection, approval from Institutional Review Board (IRB) of Al-Shifa School of Public Health Rawalpindi, Pakistan has been taken. Permission letter from the Head of Department of Al-Shifa School of Public Health was obtained regarding access to various nursing schools of Rawalpindi and Islamabad. Respondents were explained the purpose of the research and written consent was taken from each participant. Participants were assured for the confidentiality of their data. Data collected from the respondents was kept anonymous and was not shared with anyone. Data was entered in SPSS anonymously. After data entry, hard copies of collected were kept at a safe place.

## CHAPTER IV: RESULTS

### 4.1. Demographic Characteristics:

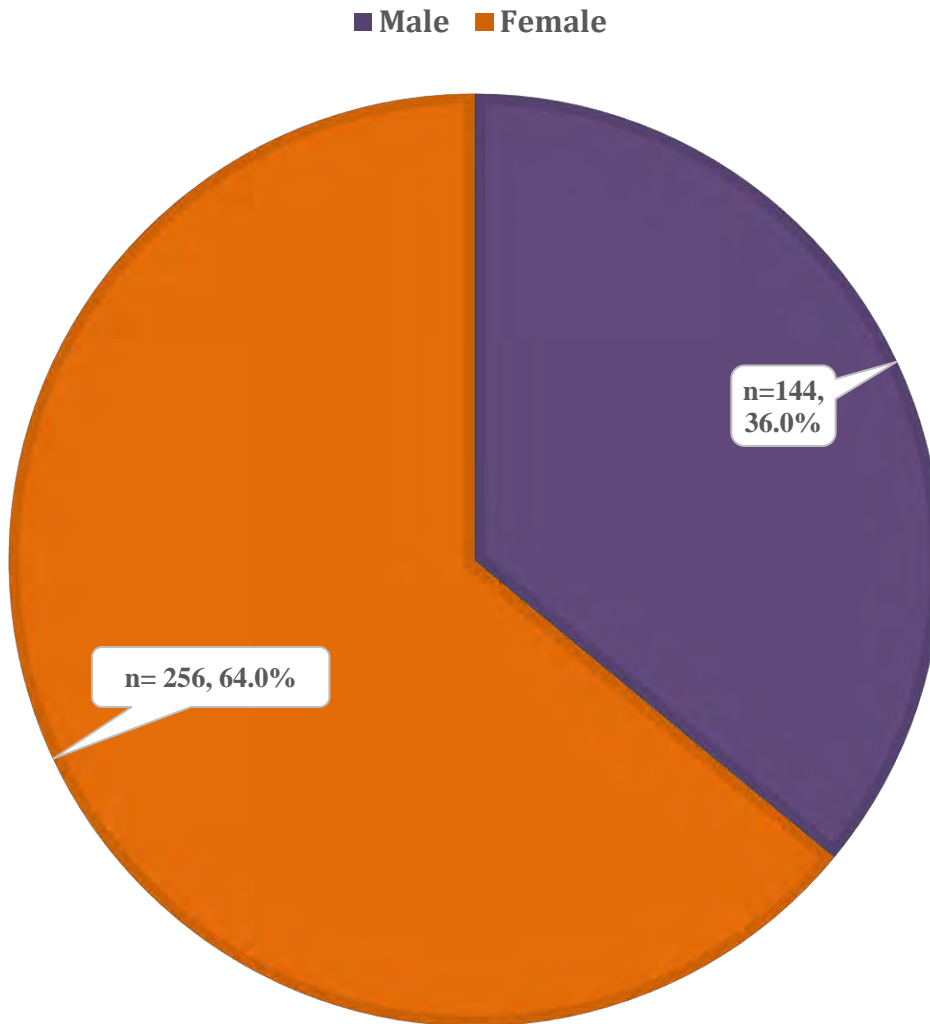
A total of 400 nursing students were included in the study. Majority of the respondents were female (n=256, 64.0%) and the age of respondents mostly varied between 16-25 years (n=351, 87.8%). A large number of respondents were having normal BMI (n=217, 54.3%). In current study, majority of the respondents were from second year (n= 139, 34.8%) while more than half of the respondents were living in hostels (n= 214, 53.5%). A detailed summary of sociodemographic characteristics of respondents is given in Table 1.

**Table 1:Socio-Demographic Variables of Respondents**

| S.No | Variable      | Frequency (n) | Percentage (%) |
|------|---------------|---------------|----------------|
| 1.   | <b>Age</b>    |               |                |
|      | 16-25 years   | 351           | 87.8           |
|      | 26-35 years   | 49            | 12.3           |
| 2.   | <b>Height</b> |               |                |
|      | 4-5 feet      | 254           | 63.5           |
|      | 5-6 feet      | 146           | 36.5           |
| 3    | <b>Weight</b> |               |                |
|      | 45-55 kg      | 269           | 67.3           |
|      | 56-65 kg      | 104           | 26             |
|      | 66-75 kg      | 26            | 6.5            |
|      | >75 kg        | 1             | 0.3            |
| 4.   | <b>BMI</b>    |               |                |
|      | Underweight   | 166           | 41.5           |
|      | Normal        | 217           | 54.3           |



|            |  |     |      |
|------------|--|-----|------|
|            | Overweight   | 17  | 4.3  |
| <b>5.</b>  | <b>Year of study</b>                               |     |      |
|            | First year   | 70  | 17.5 |
|            | Second year  | 139 | 34.8 |
|            | Third year   | 87  | 21.8 |
|            | Fourth year  | 104 | 26.0 |
| <b>6.</b>  | <b>Family income</b>                               |     |      |
|            | 10-20k   | 63  | 15.8 |
|            | 21k-50k  | 206 | 51.5 |
|            | More than 50k                                      | 131 | 32.8 |
| <b>7.</b>  | <b>Residence</b>                                   |     |      |
|            | Family   | 186 | 46.5 |
|            | Hostel   | 214 | 53.5 |
| <b>8.</b>  | <b>Education of mother</b>                         |     |      |
|            | Illiterate   | 125 | 31.3 |
|            | Matric   | 169 | 42.3 |
|            | Intermediate                                       | 65  | 16.3 |
|            | Graduation   | 34  | 8.5  |
|            | Masters  | 7   | 1.8  |
| <b>9.</b>  | <b>Participation in extracurricular activities</b> |     |      |
|            | No   | 204 | 51.0 |
|            | Yes  | 196 | 49.0 |
| <b>10.</b> | <b>Family type</b>                                 |     |      |
|            | Nuclear  | 270 | 67.5 |
|            | Joint  | 130 | 32.5 |
| <b>11.</b> | <b>Number of siblings</b>                          |     |      |
|            | 1-3  | 169 | 42.3 |
|            | 4-6  | 211 | 52.8 |
|            | 7-10   | 20  | 5.0  |

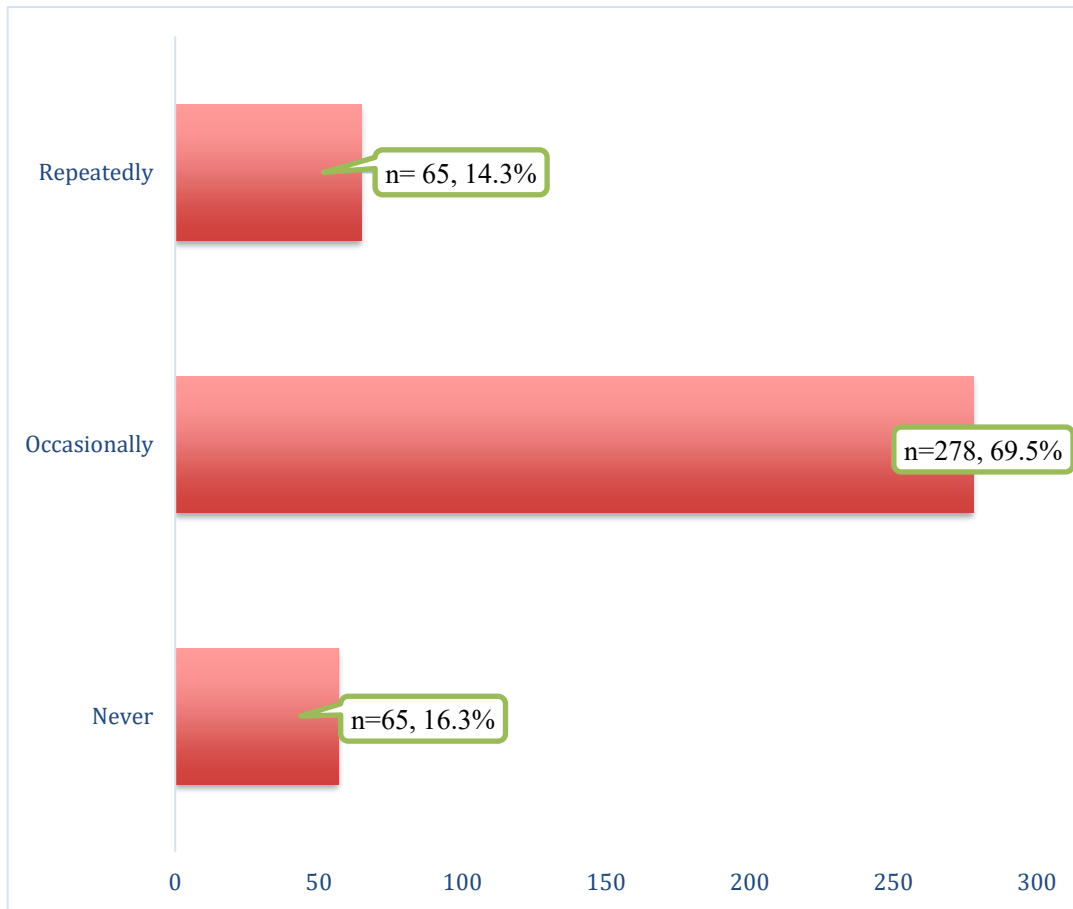


**Figure 5: Gender of Respondents**

Figure 4 shows that more than half of the study population was comprised of female students (n= 256, 64%).

## 4.2. Eating Healthy Meals:

Students were asked eight questions regarding eating healthy meals and they were categorized into three categories; eating healthy meal repeatedly, occasionally and never.

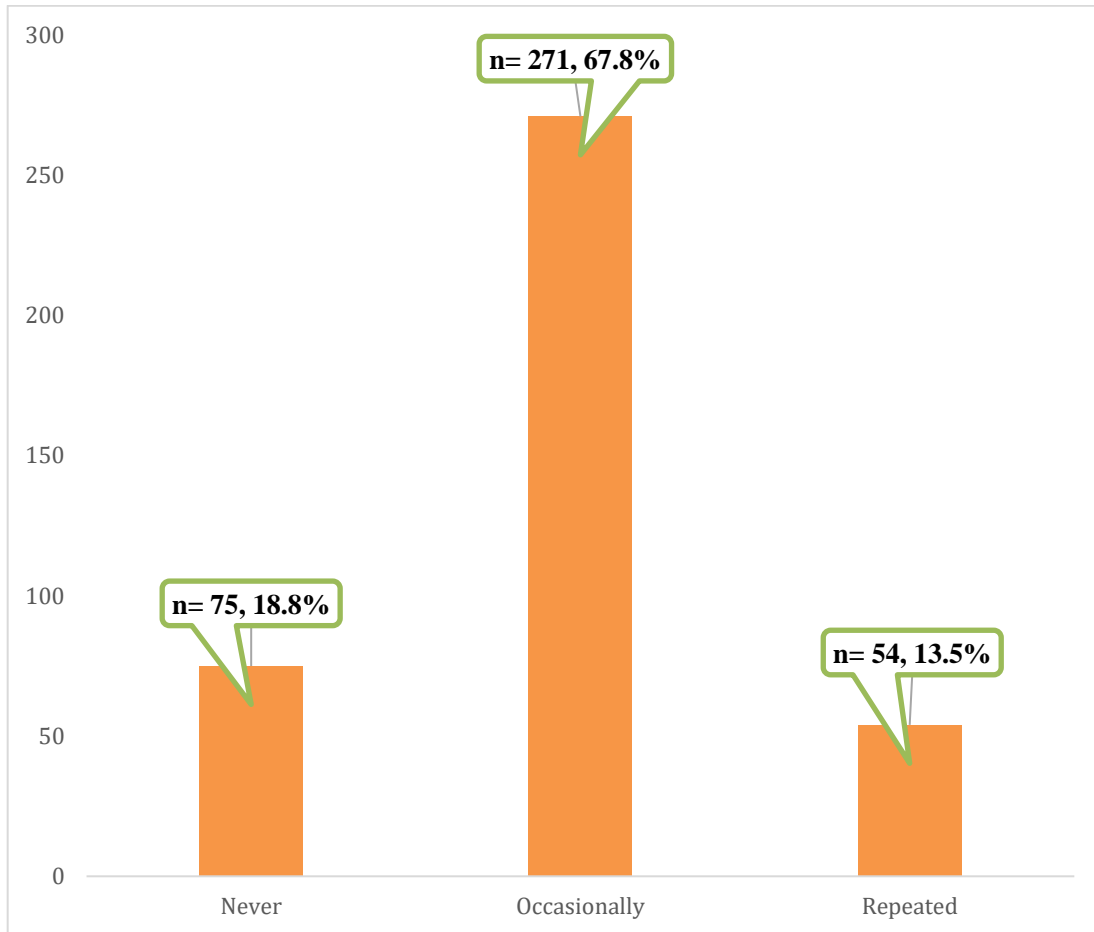


**Figure 6: Eating Healthy Meals**

Results revealed that majority of the respondents ate healthy meals occasionally (n= 278, 69.5%) while 16% respondents never ate healthy meal (n= 65) as shown in figure 5.

## 4.3. Eating Unhealthy Meals:

Students were asked thirteen questions regarding eating unhealthy meals and they were categorized into three categories; eating unhealthy meal repeatedly, occasionally and never.

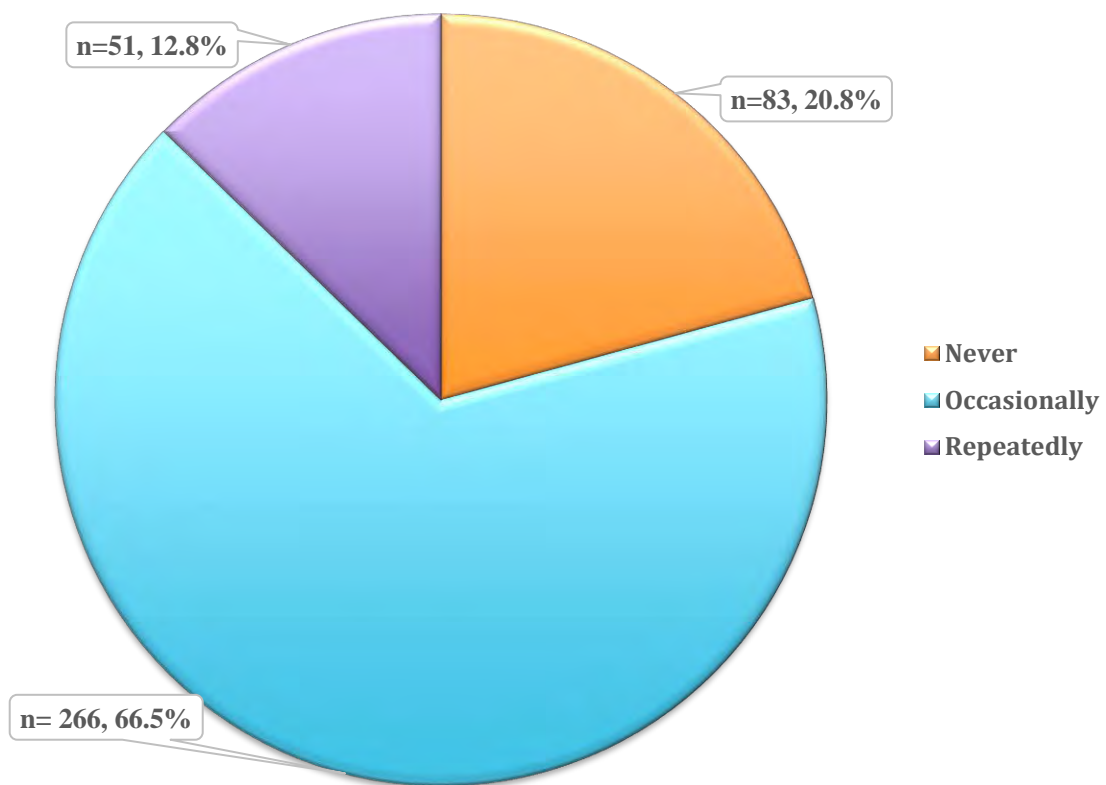


**Figure 7: Eating Unhealthy Meals**

Results revealed that majority of the respondents ate unhealthy meals occasionally (n= 271, 67.8%) while nearly 19% respondents never ate unhealthy meal (n= 75) as shown in figure 6.

#### 4.4. Following Healthy Eating Habits:

In current study, students were asked seven questions to know if they keep track of their healthy eating habits. Students were categorized into three groups based on the findings; never followed healthy eating habits, occasionally and repeatedly followed healthy eating habits. Results are given in figure 7.

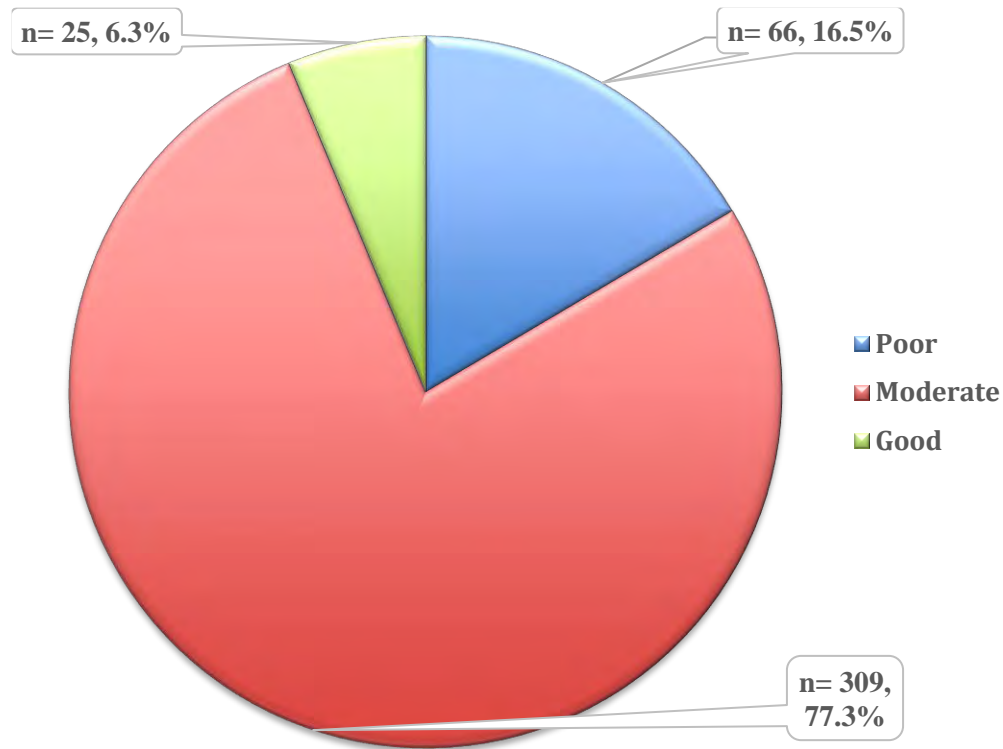


**Figure 8: Following Healthy Eating Habits**

It can be seen from above results that majority of the students occasionally followed healthy eating habits and kept their tract (n= 266, 66.5%) while, nearly 21% students repeatedly followed their healthy eating habits.

#### 4.5. Breakfast Eating Habits of Nursing Students:

Students were asked questions regarding their breakfast eating habits and were categorized into three categories; poor, moderate and good. Results are given in figure 8.



**Figure 9: Breakfast Eating Habits**

Figure 8 shows that 6% of the students reported poor breakfast eating habits (n= 25) while 77% (n= 309) students were those who reported a moderate type of breakfast eating habits; neither good nor bad. Only 17% (n= 66) students reported good breakfast eating habits.

## 4.6. Descriptive Summary of Attention Test for Measuring Cognitive function among Students:

In the current study, Attention test was used to determine cognitive function of respondents. A summary of results is given in Table 2.

**Table 2: Cognitive Functions of Respondents**

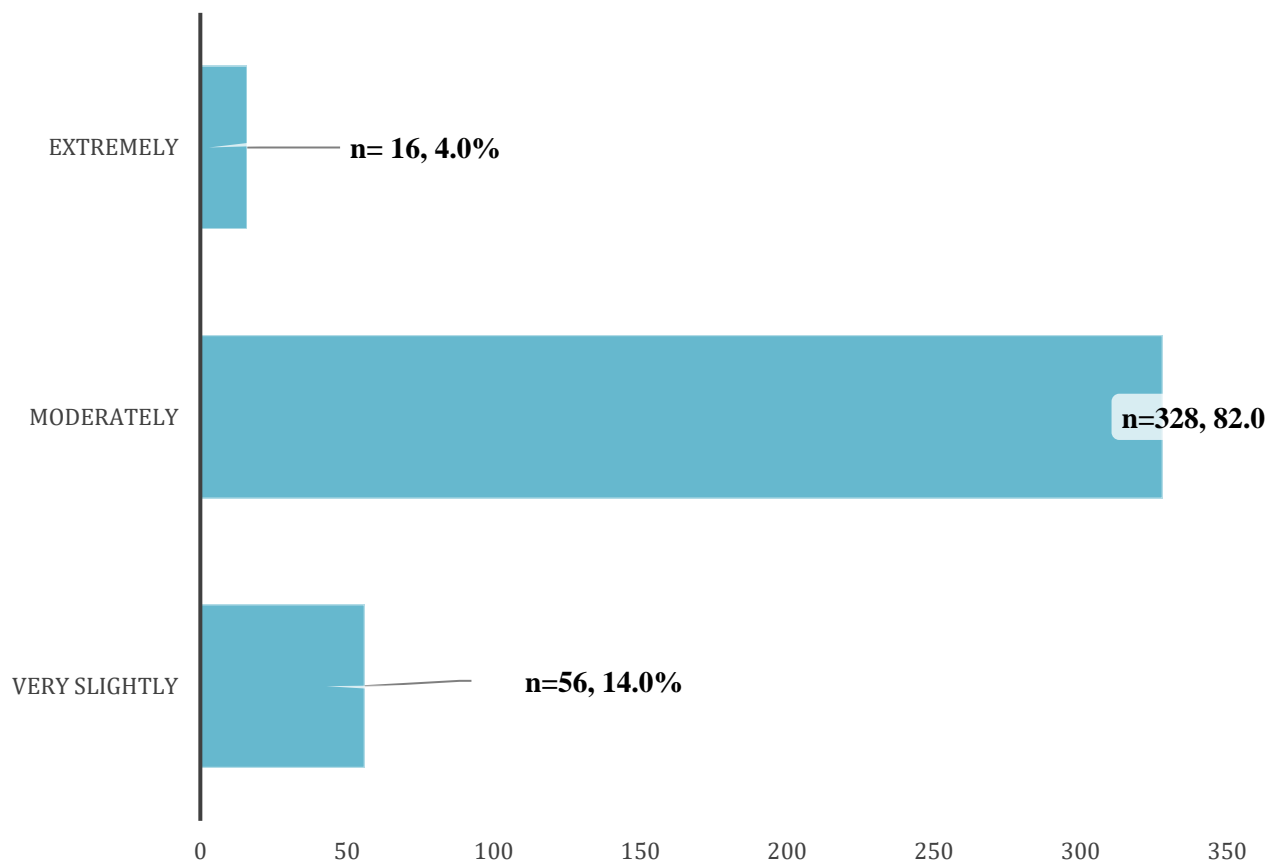
| S.No | Variables   | Frequency (n) | Percentage (%) |
|------|---|---------------|----------------|
| 1.   | <b>Working hard on something but still distracted by the events around me</b>                         |               |                |
|      | Almost never  | 55            | 13.8           |
|      | Sometimes   | 173           | 43.3           |
|      | Often   | 109           | 27.3           |
|      | Always  | 63            | 15.8           |
| 2.   | <b>Trying to focus my attention on something so have difficulty blocking out distracting thoughts</b> |               |                |
|      | Almost never  | 92            | 23.0           |
|      | Sometimes   | 149           | 37.3           |
|      | Often   | 109           | 27.3           |
|      | Always  | 50            | 12.5           |
| 3.   | <b>I have a hard time concentrating when excited</b>  |               |                |
|      | Almost never  | 88            | 22.0           |
|      | Sometimes   | 114           | 28.5           |
|      | Often   | 109           | 27.3           |
|      | Always  | 89            | 22.3           |
| 4.   | <b>Can quickly switch from one task to another</b>  |               |                |
|      | Almost never  | 79            | 19.8           |
|      | Sometimes   | 107           | 26.8           |
|      | Often   | 114           | 28.5           |
|      | Always  | 100           | 25.0           |
| 5.   | <b>Takes a time to be involved in a new task</b>  |               |                |
|      | Almost never  | 72            | 18.0           |
|      | Sometimes   | 146           | 36.5           |

|            |   |     |      |
|------------|---|-----|------|
|            | Often   | 110 | 25.5 |
|            | Always  | 72  | 16.8 |
| <b>6.</b>  | <b>Difficult for me to coordinate my attention between listening and writing required when taking notes during lectures</b> |     |      |
|            | Almost never  | 87  | 21.8 |
|            | Sometimes   | 144 | 36.0 |
|            | Often   | 102 | 25.5 |
|            | Always  | 67  | 16.8 |
| <b>7.</b>  | <b>I can become interested in a new topic very quickly</b>  |     |      |
|            | Almost never  | 66  | 16.5 |
|            | Sometimes   | 104 | 26.0 |
|            | Often   | 138 | 34.5 |
|            | Always  | 92  | 23.0 |
| <b>8.</b>  | <b>I have hard time coming up with new ideas quickly</b>  |     |      |
|            | Almost never  | 74  | 18.5 |
|            | Sometimes   | 137 | 34.3 |
|            | Often   | 110 | 27.5 |
|            | Always  | 79  | 19.8 |
| <b>9.</b>  | <b>After being interrupted or distracted, I can easily shift my attention back to what I was doing before</b>               |     |      |
|            | Almost never  | 81  | 20.3 |
|            | Sometimes   | 128 | 32.0 |
|            | Often   | 113 | 28.3 |
|            | Always  | 78  | 19.5 |
| <b>10.</b> | <b>It is easy for me to alternate between two different tasks</b>   |     |      |
|            | Almost never  | 72  | 18.0 |
|            | Sometimes   | 141 | 35.3 |
|            | Often   | 124 | 31.0 |
|            | Always  | 63  | 15.8 |



#### 4.7. Mood, Positive Affect and Negative Affect Scale (PANAS):

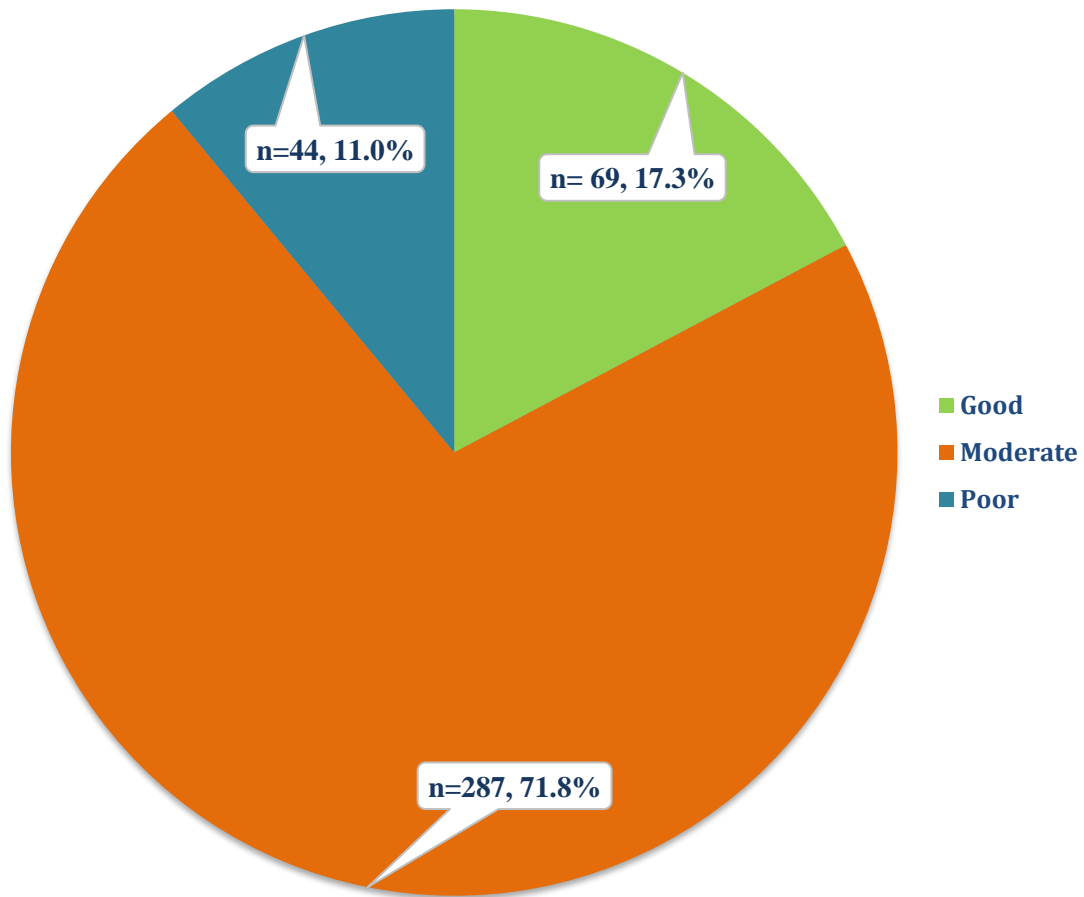
In current study, students were asked twenty questions of Mood, Positive Affect and Negative Affect Scale to determine their emotional feeling over the past week.



**Figure 10: Indicate the extent you have felt emotional over the past week**

Results in figure 9 indicate that majority of the respondents felt moderately emotional in the last week (n= 328, 82%).

#### 4.8. Cognitive Functions among Respondents:



**Figure 11: Cognitive Function of Respondents**

Results revealed that majority of the respondents reported moderate level of cognitive function (n= 287, 71.8%).

## 4.9. Inferential Analysis:

### 4.9.1. Association of Cognitive function with Breakfast Eating

#### Habits:

Breakfast eating habits and cognitive function of students were analyzed for their association with each other using Pearson Chi Square test. Results revealed that majority of the good cognitive functioning was reported by those students who had good breakfast eating habits (36%) as compared to those who had poor breakfast eating habits (9%). These results are statistically significant (p value<0.05) representing the association between breakfast eating habits and cognitive function of respondents.

**Table 3: Association of Cognitive function with Breakfast Eating Habits among Nursing Students**

|                                | Cognitive Functions |            |          | Chi-Square (df) | P-value        |
|--------------------------------|---------------------|------------|----------|-----------------|----------------|
|                                | Poor                | Moderate   | Good     |                 |                |
| <b>Breakfast Eating Habits</b> |                     |            |          |                 |                |
| Poor                           | 22 (33.3)           | 38 (57.6)  | 6 (9.1)  | 31.095 (4)      | <b>0.001**</b> |
| Moderate                       | 45 (14.6)           | 235 (76.1) | 29 (9.4) |                 |                |
| Good                           | 2 (8.0)             | 14 (56.0)  | 9 (36.0) |                 |                |

N= 400, \*p value<0.05, \*\*p value<0.01

#### 4.9.1. Association of Cognitive function with Sociodemographic Characteristics:

Association of cognitive functions with demographic variables was determined using Pearson Chi Square test of Independence after confirming the assumptions of the test. All the p-values below 0.05 were considered statistically significant.

Results showed that respondents having normal BMI mainly reported good cognitive functions (n= 30, 13.8%). Similarly, second year students reported good cognitive function (n= 29, 20%). Moreover, respondents with more number of siblings reported good cognitive function (n= 6, 30%) as compared to respondents who have less number of siblings. All these findings are statistically significant (p value<0.05) while no significant association was found with other sociodemographic characteristics (p value>0.05). A summary of association of socio-demographic characters and cognitive function is given in the Table 4.

**Table 4: Association Between Cognitive Function of Nursing Students and their Sociodemographic Characteristics**

| S.No | Variables     | Cognitive Functions |            |           | Chi Square (df) | P-value |
|------|---------------|---------------------|------------|-----------|-----------------|---------|
|      |               | Almost Never        | Sometimes  | Always    |                 |         |
| 1.   | <b>Gender</b> |                     |            |           | 2.982<br>(2)    | 0.225   |
|      | Male          | 28 (19.4)           | 105 (72.9) | 11 (7.6)  |                 |         |
|      | Female        | 41 (16.0)           | 182 (71.1) | 33 (12.9) |                 |         |

|             |  |           |            |           |               |                |
|-------------|--|-----------|------------|-----------|---------------|----------------|
| <b>2.</b>   | <b>Age</b>   |           |            |           |               |                |
|             | 16-25 years  | 63 (17.9) | 252 (71.8) | 36 (10.3) | 0.324         | 0.324          |
|             | 26-35 years  | 6 (12.2)  | 35 (71.4)  | 8 (16.3)  | (2)           |                |
| <b>3.</b>   | <b>BMI</b>   |           |            |           |               | <b>0.019*</b>  |
|             | Underweight  | 40 (24.1) | 113 (68.1) | 13 (7.8)  | 11.157<br>(4) |                |
|             | Normal   | 27 (12.4) | 160 (73.7) | 30 (13.8) |               |                |
| Overweight  | 2 (11.8)   | 14 (82.4) | 1 (5.9)    |           |               |                |
| <b>4.</b>   | <b>Years of study</b>                              |           |            |           |               | <b>0.001**</b> |
|             | First year   | 16 (22.9) | 47 (67.1)  | 7 (10.0)  | 26.886<br>(6) |                |
|             | Second year  | 19 (13.7) | 91 (65.5)  | 29 (20.0) |               |                |
|             | Third year   | 18 (20.7) | 68 (78.2)  | 1 (1.1)   |               |                |
| Fourth year | 16 (15.4)  | 81 (77.9) | 7 (6.7)    |           |               |                |
| <b>5.</b>   | <b>Education of mother</b>                         |           |            |           |               | 0.500          |
|             | Illiterate   | 23 (18.4) | 87 (69.6)  | 15 (12.0) | 7.008<br>(8)  |                |
|             | Matric   | 29 (17.2) | 118 (69.8) | 22 (13.0) |               |                |
|             | Intermediate                                       | 11 (16.9) | 52 (80.0)  | 2 (3.1)   |               |                |
|             | Graduation   | 5 (14.7)  | 24 (70.6)  | 5 (14.7)  |               |                |
| Masters     | 1 (14.3)   | 6 (85.7)  | 0 (0.0)    |           |               |                |
| <b>6.</b>   | <b>Participation in extracurricular activities</b> |           |            |           |               | 0.061          |
|             | No   | 44 (21.6) | 140 (68.6) | 20 (9.8)  | 5.608<br>(2)  |                |
|             | Yes  | 25 (12.8) | 147 (75.0) | 24 (12.2) |               |                |
| <b>7.</b>   | <b>Number of siblings</b>                          |           |            |           |               | <b>0.031*</b>  |
|             | 1-3  | 30 (17.8) | 127 (75.1) | 12 (7.1)  | 10.612<br>(4) |                |
|             | 4-6  | 37 (17.5) | 148 (70.1) | 26 (12.3) |               |                |
| 7-10        | 2 (10.0)   | 12 (60.0) | 6 (30.0)   |           |               |                |

N= 400, \*p value<0.05, \*\*p value<0.01

## CHAPTER V: DISCUSSION

Current study was carried out to assess the breakfast eating habits and cognitive function among nursing students. Moreover, this study also focused the association between breakfast eating habits of students and their cognitive functions.

The results of the study revealed that majority of the students reported neither good nor bad breakfast eating habits (n= 309, 77%). Only 6% students (n= 25) reported good breakfast eating habits. Results also revealed that only 14% (n= 65) students reported regularly taking healthy breakfast while 13% (n= 75) were those students who were regularly taking unhealthy breakfast. Only 12% (n= 51) of the total study population tried regularly to follow healthy eating habits. Different findings can be seen in the existing literature related to breakfast eating habits among students. A study conducted in Saudi Arabia found that nearly 35% respondents believed that they had healthy breakfast eating habits (Alzahrani et al., 2020) while the studies from Lebanon reported that 32% respondents had good breakfast eating habits (Yahia, Achkar & Abdallah, 2018). Similarly, in Malaysia, nearly 53% respondents reported following good breakfast eating habits (Nasir & Chin, 2019). The low percentage of students reporting good breakfast eating habits in current study indicated an alarming situation. Breakfast is the important meal of the day and it greatly affects the health of the person including his mental capacities. Good breakfast practice is essential for nursing students to have enough energy intake to get over the discontent caused by a rigorous program of daily studies and hospital rotations.

Present study also revealed that only 11 % (n=41) of the study population reported good cognitive functions while majority respondents reported neither good nor bad cognitive functions (n= 287, 71%). More than half of the students reported moderate levels of different emotional feelings over the past week (n= 328, 82%) while only 4 % (n= 16) reported extreme levels of emotional feeling. Varied results are reported by the previous literature. A study conducted in China revealed that nearly 29% respondents reported poor cognitive functioning (Zeng et al., 2019). Various personal and social factors are associated with cognitive development. Poor eating patterns are one of the main reasons to affect cognitive functioning among students. Burden of studies, lack of sleep and poor eating habits greatly affects the cognitive development and emotional stability of nursing students.

In current study, association between breakfast eating habits with cognitive function was determined among students. It was observed that breakfast eating habits are significantly associated with cognitive function among students (p value<0.05). Results showed that good breakfast eating habits were associated with good cognitive function (36%) while students with poor breakfast eating habits showed least percentage of good cognitive function (9%). These findings are supported by the already available literature. Study conducted by Zipp and Eissing revealed that breakfast consumption is associated with good mental performance among students (Zipp & Eissing, 2019). Similar results were proposed by another study carried out in 2022 (Peni et al., 2022). Another study conducted in China also suggests a significant association between breakfast eating habits

and cognitive development among students (Yao, Liu & Zhou, 2019). Eating breakfast has a undeniable impact on the cognitive functioning of students. The frequency and quality of breakfast are important measures that determine the cognitive functioning of a person. Skipping breakfast or taking unhealthy snacks in the very beginning of the day have detrimental and long term effects on the mental health of students that also leads to their poor educational performance.

The results of current study also showed that number of siblings is also an important factor while determining the cognitive functioning of a person. It was found that having large number of siblings is associated with good cognitive function as compared to less number siblings (30% vs 7%). These findings are also statistically significant ( $p$  value $<0.05$ ). previous studies also confirm the association between number of siblings and cognitive development. A study conducted in Israel found that having older siblings leads to better social adjustment, improved social functioning and higher cognitive development ( $p$  value $<0.05$ ) (Ben-Itzhak, Nachshon & Zachor, 2019). Similarly, a study had been carried out in Netherland and results suggested that having more siblings and having an older siblings significantly enhance the cognitive functioning of individual ( $p$  value $<0.05$ ) (M. J. de Veld et al., 2021). Siblings play an important role in the personality development and mental well-being of an individual. A person is likely to learn many things from the experiences of his siblings and hence, this accelerates his cognitive development.



Present study also revealed that BMI is significantly associated with cognitive development of respondents ( $p$  value $<0.05$ ). It was observed that students with normal BMI mainly reported good cognitive function (14%) as compared to underweight students (6%) and overweight students (8%). Current findings are supported by the previous studies. A study conducted in Malaysia also reported that obese students were more likely to have poor cognitive functioning as compared to those with normal BMI (Koon Poh et al., 2019). Similar results are reported by Sandjaja et al. among South Asian population (Sandjaja et al., 2018). The possible explanation lies within the nutritional status. Having adequate amount of micro and macro nutrients can help to maintain the proper body weight of an individual as well as adequate development of cognitive functioning.

In current study, it was also noted that study year of students is also significantly associated with their cognitive functioning ( $p$  value $<0.05$ ). students of second year reported maximum good cognitive development as compared to other classes. A number of factors can possibly relate to this fact. The class environment, peers' influence, eating patterns, family environment and personal characteristics. However, no previous study provides enough evidence in this regard.

### **5.1. Strengths:**

1. The study was aimed to determine the association of breakfast eating habits and cognitive function among nursing students, As there is a paucity of literature

regarding this aspect especially in nursing students, so the results of the study adds a significant contribution in the existing national literature.

2. The study included internationally valid and accepted tools for the measurement of cognitive function among students.
3. The researcher included a large sample of nursing students through random sampling which is true representative of whole population.

## **5.2. Limitations:**

1. The study duration was limited.
2. Only public nursing colleges were included in the study and students from private colleges were not taken, so the findings of this study cannot be generalized without further investigation.

## **CHAPTER VI: CONCLUSION**

Breakfast is an important meal of the day which has great implications upon the cognitive development of an individual. Good breakfast eating habits leads to improved cognitive functioning. Moreover, various socio-demographic characteristics can also affect cognitive functioning. Number of siblings, year of study and BMI of the respondents is found to be significantly associated with cognitive development. Good breakfast eating practices and having an ideal BMI can improve the cognitive development among students.

## **CHAPTER VII: RECOMENDATIONS:**

Based on the current findings, following recommendations are given:

### **Policy level:**

1. Proper guidelines should be available regarding breakfast of students at school, college and university level.
2. Media campaigns may be used to create awareness regarding benefits of breakfast and hazards of skipping breakfast.

### **Educational Institutes' level:**

1. Positive and healthy environment should be provided in educational institutions to promote cognitive development of students.
2. Students should be involved in physical activities as it can greatly enhance their cognitive functioning.

### **Family level:**

1. Parents should pay special attention towards eating habits of their children.
2. Siblings have a great influence on the cognitive development so it is important to have a positive and healthy relationship with siblings which will help to improve social interaction as well as cognitive development.
3. Parents should encourage their children to take part in physical activities.

**Personal level:**

1. Active participation in outdoor plays and other physical activity can help to improve cognitive development.
2. Taking healthy breakfast regularly and following healthy eating habits can help to boost the cognitive development.

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## APPENDIX-A QUESTIONNAIRE

### Association of breakfast eating habit with cognitive functions among Nursing students of Rawalpindi & Islamabad

#### SECTION-1

##### Sociodemographic Characteristics

**1. Gender:**

- 1) Male
- 2) Female

**2. Age:** \_\_\_\_\_

**3. Weight:** \_\_\_\_\_

**4. Height:** \_\_\_\_\_

**5. BMI:**

- 1) Underweight
- 2) Normal
- 3) Overweight

**6. Year of study:** \_\_\_\_\_

**7. Institution:**

- 1) Public
- 2) Private

**8. Expected family income:**

- 1) 10,000-20,000 Rs/-
- 2) 21,000-50,000 Rs/-
- 3) More than 50,000 Rs/-

**9. Residence:**

- 1) With family

2) Hostel

**10. Education of mother:**

- 1) Illiterate
- 2) Matric
- 3) Intermediate
- 4) Graduation
- 5) Masters

**11. Participation in extracurricular activities:**

- 1) No
- 2) Yes

**12. Family type:**

- 1) Nuclear
- 2) Joint

**13. No. of siblings:** \_\_\_\_\_

**SECTION-2**

**Breakfast eating habits**

| Items                             | Never <sup>1</sup> | Rarely <sup>2</sup> | Occasionally <sup>3</sup> | Often <sup>4</sup> | Repeatedly <sup>5</sup> |
|-----------------------------------|--------------------|---------------------|---------------------------|--------------------|-------------------------|
| <b>Eating Healthy Meal</b>        |                    |                     |                           |                    |                         |
| 1. Eat breakfast daily            |                    |                     |                           |                    |                         |
| 2. Eat more vegetables            |                    |                     |                           |                    |                         |
| 3. Eat more fruits.               |                    |                     |                           |                    |                         |
| 4. Eat or drink more dairy foods. |                    |                     |                           |                    |                         |
| 5. Eat more whole grain foods.    |                    |                     |                           |                    |                         |



|  |  |  |  |  |  |
|--|--|--|--|--|--|
| 6. Eat low-fat salad dressing.         |  |  |  |  |  |
| 7. Meals contain all food elements     |  |  |  |  |  |
| 8. Eat breakfast purposefully          |  |  |  |  |  |
| <b>Eating Unhealthy Meal</b>           |  |  |  |  |  |
| 1. Eat fast food                       |  |  |  |  |  |
| 2. Eat fatty food                      |  |  |  |  |  |
| 3. Eat frying food                     |  |  |  |  |  |
| 4. Eat dessert.                        |  |  |  |  |  |
| 5. Eat food from restaurants           |  |  |  |  |  |
| 6. Drink fizzy with meals              |  |  |  |  |  |
| 7. Drink tea after meals               |  |  |  |  |  |
| 8. Drink coffee after meals            |  |  |  |  |  |
| 9. Eat snacks between meals            |  |  |  |  |  |
| 10. Eat salty food                     |  |  |  |  |  |
| 11. Eat canned food.                   |  |  |  |  |  |
| 12. Eat under cooked food              |  |  |  |  |  |
| 13. Eat spicy food.                    |  |  |  |  |  |
| <b>Following Healthy Eating Habits</b> |  |  |  |  |  |

|  |  |  |  |  |  |
|--|--|--|--|--|--|
| 1. Keep track of how many meal you eat                           |  |  |  |  |  |
| 2. Keep track of food elements in your meals                     |  |  |  |  |  |
| 3. Remind yourself that eating breakfast is healthy              |  |  |  |  |  |
| 4. Remind yourself to drink fewer sodas or sugared drinks        |  |  |  |  |  |
| 5. Keep track of servings eaten daily from fruits and vegetables |  |  |  |  |  |
| 6. Keep track of servings you eat daily from whole grain foods.  |  |  |  |  |  |
| 7. Keep track of servings you eat daily from dairy foods         |  |  |  |  |  |

**SECTION-3**

**Cognitive function**

**Mood, Positive Affect and Negative Affect Scale (PANAS)**

| <b>Indicate the extent you have felt this way over the past week</b> | <b>Very slightly/Not at all<br/>1</b> | <b>A little<br/>2</b> | <b>Moderately<br/>3</b> | <b>Quite a bit<br/>4</b> | <b>Extremely<br/>5</b> |
|--|---------------------------------------|-----------------------|-------------------------|--------------------------|------------------------|
| 1. Interested  |                                       |                       |                         |                          |                        |
| 2. Distressed  |                                       |                       |                         |                          |                        |
| 3. Excited   |                                       |                       |                         |                          |                        |

|                 |  |  |  |  |  |
|-----------------|--|--|--|--|--|
| 4. Upset        |  |  |  |  |  |
| 5. Strong       |  |  |  |  |  |
| 6. Guilty       |  |  |  |  |  |
| 7. Scared       |  |  |  |  |  |
| 8. Hostile      |  |  |  |  |  |
| 9. Enthusiastic |  |  |  |  |  |
| 10. Proud       |  |  |  |  |  |
| 11. Irritable   |  |  |  |  |  |
| 12. Alert       |  |  |  |  |  |
| 13. Ashamed     |  |  |  |  |  |
| 14. Inspired    |  |  |  |  |  |
| 15. Nervous     |  |  |  |  |  |
| 16. Determined  |  |  |  |  |  |
| 17. Attentive   |  |  |  |  |  |
| 18. Jittery     |  |  |  |  |  |
| 19. Active      |  |  |  |  |  |
| 20. Afraid      |  |  |  |  |  |

**Attention Test**

|  | <b>Almost<br/>never 1</b> | <b>Sometimes2</b> | <b>Often3</b> | <b>Always4</b> |
|--|---------------------------|-------------------|---------------|----------------|
| 1. When I am working hard on something, I still get distracted by the events around me.  |                           |                   |               |                |
| 2. When trying to focus my attention on something, I have difficulty blocking out distracting thoughts.                            |                           |                   |               |                |
| 3. I have a hard time concentrating when I'm excited about something   |                           |                   |               |                |
| 4. I can quickly switch from one task to another.  |                           |                   |               |                |
| 5. It takes me a while to get really involved in a new task.   |                           |                   |               |                |
| 6. It is difficult for me to coordinate my attention between the listening and writing required when taking notes during lectures. |                           |                   |               |                |

|  |  |  |  |  |
|--|--|--|--|--|
| 7. I can become interested in a new topic very quickly when I need to.                                     |  |  |  |  |
| 8. I have a hard time coming up with new ideas quickly.  |  |  |  |  |
| 9. After being interrupted or distracted, I can easily shift my attention back to what I was doing before. |  |  |  |  |
| 10. It is easy for me to alternate between two different tasks.  |  |  |  |  |

*Thanks for your participation!*

## **APPENDIX-B CONSENT FORM**

I am Yaqoob Bashor, student of MSPH- Final Semester, Alshifa School of Public Health, Alshifa Eye Hospital, Rawalpindi. I am doing research on “Association of Breakfast Eating Habit with Cognitive Functions among Nursing Students of Rawalpindi and Islamabad”.

### **PURPOSE OF THE RESEARCH**

The purpose of this study is to find out association of breakfast eating habit with cognitive functions among nursing students of Rawalpindi and Islamabad”.

### **PARTICIPATION**

I do not anticipate that taking this study will contain any risk or inconvenience to you. Your participation is strictly voluntary and you may withdraw your participation at any time without penalty. I request you to answer the questions as honestly as possible. It will take no longer than 15 minutes to complete a questionnaire. All information collected will be used only for research purpose and will be kept highly confidential. Your identity and your responses will not be identifiable; all data will be stored anonymously. As this is solely a student project no incentive will be provided. Once study is completed, I would be happy to share the results with you if you desire.

Thank you for agreeing to participate in this study. Your feedback is important.

---

### **Consent**

I have read and understand the information sheet and agree to take part in the study.

**Signature**\_\_\_\_\_ **Date**\_\_\_\_\_

## APPENDIX-C IRB LETTER



AL-SHIFA SCHOOL OF PUBLIC HEALTH  
PAKISTAN INSTITUTE OF OPHTHALMOLOGY  
AL-SHIFA TRUST, RAWALPINDI

MSPH-IRB/14-28  
27<sup>th</sup> Sep, 2022

### TO WHOM IT MAY CONCERN

This is to certify that **Yaqoob Basheer** S/O **Basheer Masih** is a student of Master of Science in Public Health (MSPH) final semester at Al-Shifa School of Public Health, PIO, Al-Shifa Trust Rawalpindi. He/she has to conduct a research project as part of curriculum & compulsory requirement for the award of degree by the Quaid-i-Azam University, Islamabad. His/her research topic which has already been approved by the Institutional Review Board (IRB) is “**Association of breakfast eating habit with cognitive functions among nursing students of Rawalpindi and Islamabad**”.

Please provide his/her necessary help and support in completion of the research project. Thank you.

Sincerely,

Dr. Ayesha Babar Kawish  
Head  
Al-Shifa School of Public Health, PIO  
Al-Shifa Trust, Rawalpindi

MSPH-IRB/14-28  
27<sup>th</sup> Sep, 2022

## APPENDIX-D GANTT CHART

| Activities                        | August 2022 | September 2022 | October 2022 | November 2022 | December 2022 | January 2023 | February 2023 |
|-----------------------------------|-------------|----------------|--------------|---------------|---------------|--------------|---------------|
| Literature search                 |             |                |              |               |               |              |               |
| Synopsis writing and IRB approval |             |                |              |               |               |              |               |
| Pilot testing                     |             |                |              |               |               |              |               |
| Data collection and entry         |             |                |              |               |               |              |               |
| Data analysis                     |             |                |              |               |               |              |               |
| Write-up                          |             |                |              |               |               |              |               |
| Thesis submission                 |             |                |              |               |               |              |               |



## Appendix-E Budget

| <b>Budget item</b>       | <b>Transport</b>   | <b>Stationery and internet</b> | <b>Printing</b>    | <b>Publishing</b>  |
|--------------------------|--------------------|--------------------------------|--------------------|--------------------|
| <b>Pilot testing</b>     | <b>500 Rs/-</b>    | <b>6000 Rs/-</b>               | <b>4000 Rs/-</b>   | <b>-</b>           |
| <b>Data collection</b>   | <b>12,000 Rs/-</b> | <b>8,000 Rs/-</b>              | <b>-</b>           | <b>-</b>           |
| <b>Thesis write-up</b>   | <b>1,000 Rs/-</b>  | <b>9,000 Rs/-</b>              | <b>6,000 Rs/-</b>  | <b>25,000 Rs/-</b> |
| <b>Total expenditure</b> | <b>13,500 Rs/-</b> | <b>23,000 Rs/-</b>             | <b>10,000 Rs/-</b> | <b>25,000 Rs/-</b> |
| <b>Grand total</b>       | <b>71,500 Rs/-</b> |                                |                    |                    |

## Appendix-F Cronbach's Alpha

