

Master of Science in Public Health



***Mapping Nutritional Literacy: A Cross-Sectional
study on socio-economic influences among
university students in Quetta, Pakistan.***

By

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(2022)

***(Mapping Nutritional Literacy: A Cross-
Sectional study on socio-economic influences
among university students in Quetta, Pakistan.)***

(Sharifullah)

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Declaration

In submitting this dissertation, I certify that I have read and understood the rules and regulations of DPH and QAU regarding assessment procedures and offences and formally declare that all work contained within this document is my own apart from properly referenced quotations.

I understand that plagiarism is the use or presentation of any work by others, whether published or not, and can include the work of other candidates. I also understand that any quotation from the published or unpublished works of other persons, including other candidates, must be clearly identified as such by being placed inside quotation marks and a full reference to their source must be provided in proper form.

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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ABSTRACT

Introduction: Nutritional literacy is a crucial determinant of individuals' dietary behaviors and health outcomes, particularly among young adults. This cross-sectional study aimed to assess the nutritional literacy levels and explore the socio-economic influences among university students in Quetta, Pakistan. Drawing upon existing literature, socio-economic variables such as educational level, employment status, and income were hypothesized to be associated with nutritional literacy among the study population.

Methods: A convenient sampling method was employed to recruit 351 university students from various disciplines and educational backgrounds. Data were collected using a validated Nutritional Literacy Assessment Questionnaire, which measured participants' knowledge, attitudes, and behaviors related to nutrition. Descriptive statistics and inferential analyses, including chi-square tests, was conducted to examine the associations between socio-economic variables and nutritional literacy.

Results: The mean age of the participants was 25.43 years, with a relatively equal distribution of male (52.4%) and female (47.6%) participants. Descriptive analyses revealed that 50% of the participants belonged to the low-income category, while 37.3% were classified as having a moderate income level. Furthermore, 49.3% of the participants had a bachelor's education, while 50.7% were pursuing master's level education. Employment status analysis indicated that 50.4% of the participants were employed, whereas 49.6% were unemployed. Chi-square tests indicated a significant association between nutritional literacy and educational level ($p < 0.001$), with higher educational attainment positively correlated with greater nutritional literacy. However, no significant association was found between nutritional literacy and employment status ($p > 0.001$).

Conclusion: The findings of this study highlight the importance of educational attainment in influencing nutritional literacy levels among university students in Quetta, Pakistan. While employment status did not emerge as a significant predictor of nutritional literacy, addressing broader socio-economic disparities remains crucial for promoting healthier dietary behaviors and improving overall nutritional health outcomes in this population. Public health interventions and educational initiatives targeting nutritional literacy should prioritize strategies that address socio-economic inequalities and provide equitable access to education and resources.

Food inadequacy is a major public health concern that is mostly caused by a lack of knowledge about nutrition-related topics and has a key role in the development of chronic diseases. Health literacy, or HL, is a theoretical framework that has been utilized to support the international effort to address this problem. "Food literacy" (FL) has been a common term used to describe nutritional literacy. From this perspective, NL just means having the capacity to understand nutritional information

Keywords: Nutritional literacy, university students, socio-economic factors, Quetta, Pakistan, educational level, employment status, income, dietary behaviors

DEDICATION

In dedicating this work wholeheartedly to the loving memory of my beloved parents, I am compelled to express the profound impact they have had on shaping the person I am today. Their enduring presence in my life is not only a source of immense joy but also an unwavering wellspring of inspiration that has guided me through both triumphs and challenges.

My parents, with their boundless love and unwavering support, instilled in me the values of compassion, resilience, and the pursuit of knowledge. Their wisdom, shared through countless conversations and shared moments, forms the bedrock upon which I have built my aspirations and dreams.

In the tapestry of my life, my parents' influence is evident in every thread, weaving a narrative of love, sacrifice, and unwavering belief in my potential. Their legacy is not only the genetic inheritance but also the rich tapestry of shared memories, laughter, and the invaluable life lessons that continue to shape my character.

As I navigate the intricate dance of existence, I carry with me the indelible mark of my parents' teachings, their warmth echoing in the chambers of my heart. This dedication is a small token of gratitude for the immeasurable gift of their presence, a presence that transcends the boundaries of time and space.

In memory of my beloved parents, I dedicate this work with a profound sense of reverence and gratitude, acknowledging the profound impact they have had on my intellectual and emotional journey. Their love remains a guiding light, illuminating the path to personal and academic fulfillment.

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Furthermore, I extend my deepest gratitude to my beloved parents for their unconditional love, unwavering support, and sacrifices. Their encouragement, guidance, and belief in my abilities have been a constant source of motivation and inspiration. I am profoundly grateful for their unwavering faith in me and their relentless efforts to provide me with the best possible opportunities for success. I owe them a debt of gratitude that can never be repaid.

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LIST OF ABBREVIATIONS:

NCD	Non communicable diseases
NL	Nutritional literacy
SPSS	Statistical Package for Social Sciences
FL	Food literacy
HL	Health literacy
SES	Socioeconomic status
SEF	Socioeconomic factors

CHAPTER I: Introduction

1.1 Introduction to nutritional literacy:

Food inadequacy is a major public health concern that is mostly caused by a lack of knowledge about nutrition-related topics and has a key role in the development of chronic diseases. Health literacy, or HL, is a theoretical framework that has been utilized to support the international effort to address this problem. "Food literacy" (FL) has been a common term used to describe nutritional literacy. From this perspective, NL just means having the capacity to understand nutritional information, however FL is made up of the following: The first five skills are equivalent to NL and include: 1) reading, understanding, and evaluating the quality of nutritional information; 2) searching for and distributing food and nutrition knowledge; 3) buying and preparing food; 4) analyzing the factors that influence personal food choices; and 5) understanding how these choices affect society (1)(2) . There are three types of nutrition literacy: functional, interactive, and critical. The ability of a person to perceive and interpret dietary ideas and messages is known as functional nutrition literacy, or FNL. The cognitive abilities needed to handle nutritional concerns when engaging with partners, professionals, and affiliated shareholders are known as interactive nutrition literacy, or INL. The ability to critically assess nutrition information, spread knowledge among peers and in one's social circle, and actively address nutritional challenges and hurdles is known as critical nutrition literacy, or CNL (3)(4).

1.2 Importance of nutritional literacy:

Today, it is commonly accepted that there is a strong correlation between nutrition and

health. While eating a sufficient and well-balanced diet is important for promoting and maintaining good health throughout life, malnutrition poses a serious risk to human health because it impairs immunity, stunts physical and mental development, and increases susceptibility to disease. In particular, there is a strong correlation between the rising incidence of severe chronic non-communicable diseases (NCDs) including diabetes, cancer, and cardiovascular disease with modern poor eating habits. Countering the spread of NCDs has become a global health priority as they are the primary cause of death globally and place a heavy financial strain on individuals and health care systems. Nutrition plays a crucial role in the fight against non-communicable diseases (NCDs) since it is thought to be the most relevant modifiable determinant of health. In fact, not only has it been demonstrated that eating a healthy diet significantly reduces the risk of developing NCDs, but it is also a key component of managing and treating these conditions. It is therefore crucial to identify the primary indicators of adherence to dietary recommendations in order to prevent the development and aggravation of non-communicable diseases. Health literacy (HL) is a concept that is highlighted in the research as one of the main determinants of health-promoting activities (5) (6).

1.3 Nutritional literacy and socioeconomic factors:

College students' health literacy is influenced by a plethora of factors, as demonstrated by research (Smith et al., 2020). These factors encompass age, gender, learning characteristics such as academic year and field of study, family environment including parental education, socioeconomic status, family residence area, and employment status (Jones & Brown, 2018). Various sociodemographic variables further contribute to this complex interplay (Garcia et al., 2019)

Chronic illnesses, a leading cause of mortality in contemporary society, often arise from overweight and obesity resulting from unhealthy dietary practices (Johnson & Lee, 2017). The transition from college to independent living exacerbates these habits, heightening the risk of obesity-related disorders in adulthood (Taylor & Smith, 2016). Rooted in Bronfenbrenner's ecological model, the social-ecological framework underscores the intricate relationship between individuals and their environments (Brown & Davis, 2021). Applied to health behavior, this framework advocates for interventions that consider multiple factors across different levels (Anderson et al., 2018).

The social ecology hypothesis elucidates the connection between individuals' eating behaviors and their physical, policy-related, and sociocultural environments (Roberts & Green, 2019). Interactions between individuals and their living environments, alongside intrapersonal factors, play a significant role in shaping health behaviors (Adams & White, 2020). Income levels serve as a significant determinant of the nutritional landscape, often reflecting financial well-being (Smith & Johnson, 2019). Parental education, a fundamental component of socioeconomic position, lays the groundwork for nutritional literacy (Clark et al., 2017). Furthermore, family economic status—a composite measure encompassing income and overall financial stability—exerts additional influence on individuals' nutritional behaviors (Brown et al., 2020).

1.4 Nutritional literacy and University students of Quetta:

Exploring nutritional awareness within the demographic of university students is crucial due to the pivotal stage of development they undergo, where lifestyle choices are often solidified. Quetta's distinctive socio-cultural and economic context adds layers of complexity to this examination. The city's socio-economic diversity provides a fertile ground for understanding the various factors that influence nutritional literacy. This study aims to investigate how educational endeavors intersect with socio-economic variables to shape nutritional knowledge and behaviors, with a specific focus on individuals pursuing higher education in universities.

1.5 Significance of the study:

The aim of this cross-sectional study is to bridge this gap in knowledge by investigating the socio-economic influences on nutritional literacy among university students in Quetta. By employing a cross-sectional design, which collects data at a single point in time, the study seeks to provide a snapshot of the current state of nutritional literacy and its determinants within this specific population.

By exploring the socio-economic determinants of nutritional literacy, this research endeavor aims to contribute valuable insights to the existing body of knowledge on public health in Pakistan, particularly in the realm of higher education. The findings of this study will not only shed light on the factors influencing nutritional literacy among

university students in Quetta but will also inform the development of evidence-based interventions and policies aimed at promoting healthier dietary behaviors and reducing the burden of diet-related diseases in this demographic.

Through a comprehensive examination of the socio-economic factors shaping nutritional literacy, this study seeks to empower policymakers, healthcare practitioners, and educators to implement targeted strategies that address the unique challenges faced by university students in Quetta, Pakistan. By fostering a culture of nutritional literacy and promoting access to healthy food choices, these interventions have the potential to enhance the overall health and well-being of university students, laying the foundation for healthier communities and societies in the long run.

1.6 Rationale of the study:

The rationale behind this study is to address existing knowledge gaps concerning the impact of socioeconomic variables on nutritional literacy among university students in Quetta. By delving into this understudied area, the research seeks to enhance scholarly understanding of the intricate relationship between socio-economic factors and nutritional literacy within this specific demographic.

Moreover, the findings of this study hold significant potential to inform the development of community-based programs aimed at promoting healthier lifestyle choices and improving nutritional health among university students in Quetta. By uncovering the socio-economic determinants that influence nutritional literacy, the research provides a foundation for the design and implementation of targeted interventions tailored to the unique needs of this population.

Elaborating on this rationale, Quetta presents a distinct socio-economic landscape characterized by diverse cultural influences, economic disparities, and varying access to resources. Within this context, understanding how socio-economic variables such as

parental education, household income, and family economic status impact nutritional literacy is crucial for devising effective interventions. These interventions can range from educational initiatives aimed at improving nutrition knowledge to structural interventions addressing barriers to accessing healthy food options.

Furthermore, university students represent a crucial demographic group undergoing a transitional phase in life where lifestyle choices are often solidified. By focusing on this population, the study acknowledges the importance of targeting interventions during this critical period to promote long-term health and well-being.

Overall, the research rationale underscores the significance of investigating the socio-economic influences on nutritional literacy among university students in Quetta, not only to advance academic understanding but also to facilitate tangible improvements in nutritional health within the community. Through a comprehensive exploration of these factors, the study aims to contribute valuable insights that can guide the development of evidence-based interventions and policies aimed at fostering healthier dietary behaviors and reducing the burden of diet-related diseases among university students in Quetta, Pakistan.

1.7 Objective of the study:

- To assess the level of nutritional literacy among university students in Quetta, Pakistan, utilizing a validated quantitative measurement tool.
- To identify socio-economic variables such as parental education, household income, and family economic status that may impact nutritional literacy among university students.

CHAPTER II: Literature Review

2.1 Nutritional Literacy:

Nutrition literacy is a different kind of health literacy that refers to an individual's ability to acquire, comprehend, and apply fundamental nutrition knowledge in order to make informed dietary choices.

Nutrition literacy is a measure used to assess the efficacy of public health, health education, and health promotion initiatives due to the critical role that nutrition plays in maintaining health and preventing chronic diseases. As they adjust to independent living, college students are susceptible to pressures from their families, new environs, and places of study, which can lead to the development of harmful eating habits. Therefore, raising college students' nutrition knowledge is crucial to enhancing their physical and nutritional quality as well as the overall health of the country (9).

According to Smith and Brown et al. The ability to understand and use knowledge linked to nutrition, known as nutritional literacy, has become more important in studies on global health. The significance of comprehending the intricate relationship between socioeconomic conditions and nutritional literacy across a range of people has been underlined by research from a variety of contexts. A number of international studies demonstrate how susceptible college students are to making unhealthy food choices, which are frequently impacted by things like busy schedules, a lack of food expertise, and easy availability to processed meals on campuses (10). Given Quetta, Pakistan's setting and this group's susceptibility, it is imperative to investigate the socioeconomic factors that can affect this group's nutritional literacy.

2.2 Poor nutritional literacy and its effects:

Nutritional habits and food choices are greatly influenced by cultural influences (10). Understanding the impact of these cultural elements is essential for deciphering the complexity of nutritional literacy among university students in Quetta, which is known for its rich cultural variety and unique eating customs.

Furthermore, poor nutritional literacy has been connected to a higher incidence of conditions including diabetes, obesity, heart disease, and deficits in certain micronutrients (World Health Organization).

Noncommunicable diseases (NCDs) account for 74% of all fatalities worldwide, with 17 million deaths occurring before the age of 70. Low- and middle-income nations account for 86% of these premature fatalities. Cardiovascular illnesses cause the majority of NCD fatalities, followed by cancer, chronic respiratory diseases, and diabetes. Over 80% of early NCD fatalities are caused by these illnesses. Factors such as smoking, air pollution, poor diets, hazardous alcohol use, and physical inactivity increase the risk of dying from NCDs. The WHO NCD Country Profiles 2014 show Pakistan is burdened with twice as many non-communicable illnesses (49%) as communicable diseases (38%). An estimated 50% of all fatalities are caused by NCDs. Nutrition literacy is crucial for avoiding chronic diseases, enabling people to make informed and health-conscious eating decisions. A comprehensive understanding of nutrition and its impact on health can significantly contribute to disease prevention.(11)

2.3 Socioeconomic impact of Non communicable diseases:

The 2030 Agenda for Sustainable Development contains a goal to reduce by one third the likelihood of dying from any of the four primary NCDs between the ages of 30 and 70 by

2030. NCDs pose a danger to this goal.

NCDs and poverty are tightly related. It is anticipated that the sharp increase in NCDs would obstruct efforts to reduce poverty in low-income nations, especially by driving up family health care expenses. Because they have less access to health services and are more likely to be exposed to dangerous items like tobacco or poor eating habits, vulnerable and socially disadvantaged individuals grow ill and die sooner than persons in better social positions. NCD health care expenditures quickly deplete household budgets in low-resource settings. The crippling expenses of noncommunicable diseases (NCDs)—including their sometimes protracted and costly treatments—when paired with income loss push millions of individuals into poverty every year and hinder their growth. (12)

2.4 Prevention and Control of NCD:

Reducing the risk factors connected to NCDs is a key strategy for managing chronic illnesses. Governments and other stakeholders may lower the common modifiable risk factors at a reasonable cost. In order to inform policy and set priorities, it is critical to track the development, trends, and risk associated with NCDs.

A comprehensive strategy is required to lessen the impact of NCDs on people and society. This involves collaboration between various sectors, including health, finance, education, transportation, agriculture, and planning, in order to lower the risks associated with NCDs and to promote interventions aimed at their prevention and control.

It is essential to make investments in improved NCD management. The detection, screening, and treatment of NCDs, as well as giving those in need of it access to palliative care, are all part of their management. In addition to identifying, diagnosing, and treating NCDs, management of these illnesses include giving those in need of

palliative care access to it. To improve early identification and prompt treatment, primary health care can provide high impact important NCD therapies. Research indicates that these therapies are very cost-effective since they can prevent patients from needing more costly care if given early. It is unlikely that nations with insufficient health care coverage would offer crucial NCD interventions to all citizens. Achieving the SDG objective on NCDs requires NCD management measures. (13)

Even though the body of study on the subject is vast worldwide, there is a clear research gap concerning Quetta, Pakistan. By examining the socioeconomic impacts on nutritional literacy among college students, this study aims to close this knowledge gap and provide important insights to the local public health efforts as well as the academic debate.

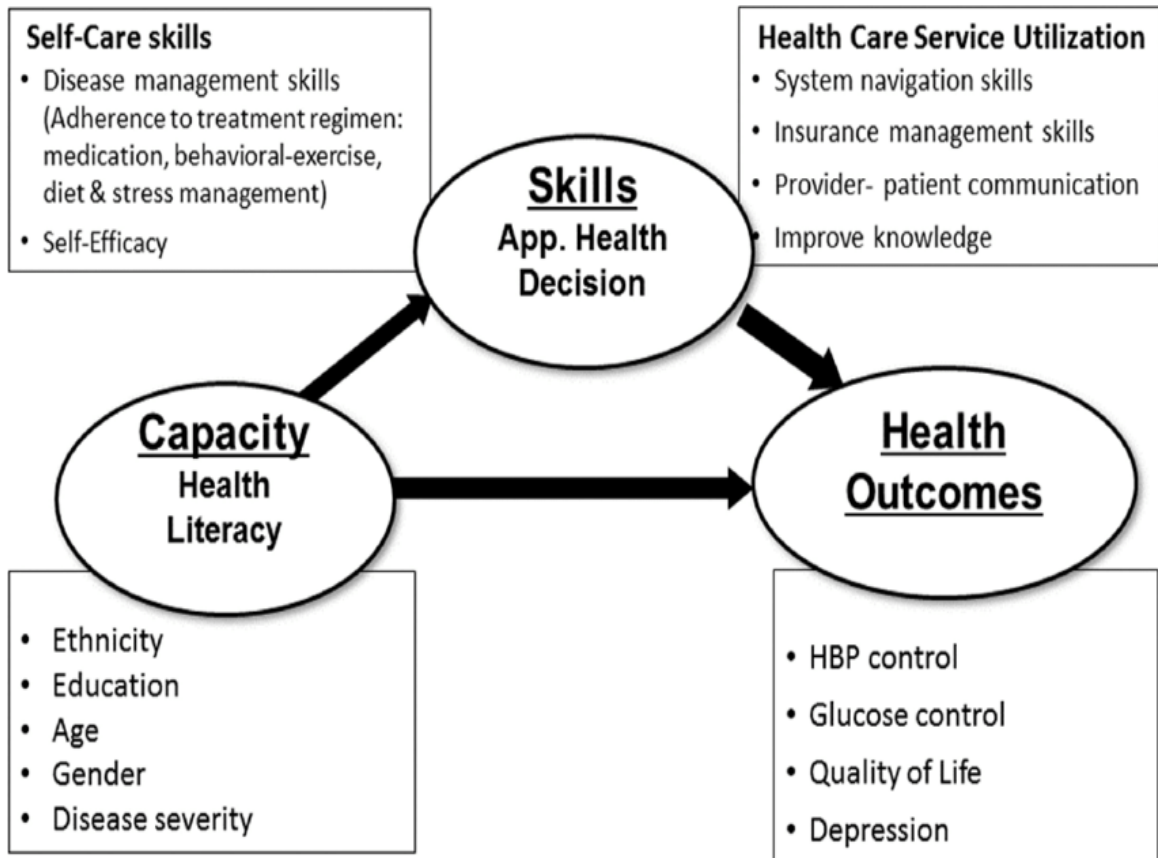
2.5 Operational definitions:

2.1 Nutritional literacy:

Nutritional literacy is the ability to use and comprehend information about food and nutrition in a thorough and practical way.

2.6 Conceptual Framework:

The conceptual framework for nutritional literacy is as follow:



CHAPTER III: METHODOLOGY

3.1 Study design

The study employs a cross-sectional research design to investigate the relationship between socio-economic variables and nutritional literacy among university students in Quetta, Pakistan. This design involves collecting data from a diverse sample of university students at a single point in time, allowing for a snapshot of their current nutritional literacy levels and socio-economic characteristics. By administering a structured questionnaire, the research captures information on participants' demographic profiles, socio-economic status, and nutritional literacy levels. This design enables researchers to examine associations between socio-economic variables and nutritional literacy, providing valuable insights into the factors that influence dietary behaviors and health outcomes among university students in Quetta. Additionally, the cross-sectional nature of the study allows for the identification of potential trends and patterns in nutritional literacy within the study population, laying the groundwork for future longitudinal research to explore causal relationships and changes over time.

3.2 Study Duration

The current research spanned a duration of six months, commencing on November 2023, and concluding on April 18, 2024. This carefully chosen timeframe allowed for a comprehensive exploration of the research objectives within a structured timeline, ensuring thorough data collection, analysis, and interpretation. Beginning in the late summer months, the study encapsulated a diverse range of seasonal variations and socio-cultural dynamics that could potentially influence the behaviors and perceptions of the study participants. By extending through the winter months, the research period also encompassed potential shifts in lifestyle habits and environmental factors, providing a holistic understanding of the phenomenon under investigation. The six-month duration facilitated the implementation of rigorous research methodologies, including data collection from diverse sources, participant interviews, and systematic analysis, thereby enabling robust findings and meaningful insights into the subject matter. Overall, the

selected timeframe ensured a meticulous and comprehensive approach to the research process, allowing for a nuanced exploration of the research questions and objectives within a defined temporal scope.

3.3 Study setting:

Quetta serves as the primary geographic location for the study. As the capital of Baluchistan province, Quetta is a major urban center with a diverse population and a significant presence of educational institutions, including universities. Its socio-cultural and economic characteristics, along with its unique geographical features, shape the context within which the study unfolds. The study is primarily conducted within the campuses of universities located in Quetta. These campuses provide the physical space where data collection activities, such as surveys or interviews, take place. University campuses serve as central hubs where students congregate, making them convenient locations for accessing the target population of university students. Within university campuses, various educational settings such as classrooms, libraries, and student lounges may serve as venues for data collection. These settings offer a conducive environment for engaging with participants and administering research instruments. The broader community context of Quetta influences the socio-economic dynamics and cultural norms that shape nutritional behaviors and literacy among university students. Factors such as access to food outlets, socio-economic disparities, and cultural preferences play a role in shaping students' dietary habits and nutritional knowledge.

Overall, the study setting encompasses a combination of physical locations within university campuses and the broader socio-cultural and economic context of Quetta, Pakistan. Understanding and contextualizing the study within these settings are essential for interpreting the findings and drawing meaningful conclusions about nutritional literacy among university students in Quetta.

3.3 Sampling Unit

The sampling unit for this study on nutritional literacy among university students in Quetta, Pakistan, is individual university students. Each university student enrolled in a university program in Quetta constitutes a sampling unit for data collection purposes. By focusing on individual students as the primary unit of analysis, the study aims to gather insights into the nutritional literacy levels and socio-economic characteristics of this specific demographic group. This approach allows researchers to assess the influence of socio-economic variables on nutritional literacy at the individual level, facilitating a detailed examination of the factors that shape dietary behaviors and health outcomes among university students in Quetta.

3.4 Sampling Technique

The sampling technique employed in this study was non-probability convenience sampling, selected for its practicality in data collection, given the ease of access to willing participants. In this study, conducted across university in Quetta, a non-probability convenience sampling technique was employed to select participants. This method was chosen for its practicality and convenience in data collection, particularly due to the accessibility of willing participants within the university settings. Convenience sampling involves selecting individuals who are readily available and willing to participate in the study, making it a feasible approach for researchers when time and resources are limited. In the context of this research on adolescent smoking behavior in Quetta, convenience sampling allowed for the efficient recruitment of participants from diverse socio-economic backgrounds and geographic locations within the city. By leveraging existing networks and community contacts within the university environment, researchers were able to quickly identify and engage adolescents who met the inclusion criteria for the study. While convenience sampling may introduce potential biases due to the non-random selection of participants, its pragmatic approach facilitated the collection of valuable data on nutritional literacy, attitudes, and perceptions across university settings. Additionally, the use of convenience sampling

enabled researchers to reach a sufficient sample size within the designated study period, ensuring robust findings and insights into the factors influencing nutritional literacy in Quetta's university environment.

3.5 Sample Selection

3.5.1 Inclusion criteria

- Include adults aged 20 to 35 years to focus on the age group most susceptible to developing non-communicable diseases and responsive to interventions promoting nutrition literacy.
- Include individuals without diagnosed non-communicable diseases but with risk factors (e.g., overweight, family history) to target those in a preventive stage and assess the impact of nutrition literacy on risk reduction.

3.5.2 Exclusion criteria

- Non-university students: Participants who are not currently enrolled in a university program will be excluded from the study to ensure that the sample represents the target population accurately.
- Incomplete responses: Responses with missing or incomplete data on key variables such as socio-economic indicators or nutritional literacy measures will be excluded from the analysis to maintain data integrity and reliability.
- Participants outside the specified age range: Individuals who fall outside the predetermined age range for university students will be excluded from the study to ensure homogeneity within the sample and align with the target population.

- Participants with pre-existing medical conditions affecting dietary behaviors: Individuals with known medical conditions (e.g., diabetes, eating disorders) that could significantly impact their dietary behaviors and nutritional literacy will be excluded to minimize confounding factors in the analysis.
- Non-consenting participants: Participants who do not provide informed consent for participation in the study will be excluded from the research to uphold ethical standards and ensure voluntary participation.
- Inadequate language proficiency: Participants with insufficient language proficiency to comprehend and respond to the survey questions accurately will be excluded to maintain the validity and reliability of the data collected.
- Duplicate responses: Duplicate responses from the same participant will be identified and excluded to prevent data duplication and ensure the integrity of the dataset.

3.6 Sample Size Calculation:

Sample size was calculated using the proportion formula through Open Epi calculator, Version 3.01 software. Calculated sample size was 361 with 95 % confidence interval (C.I) and 5% margin of error. The calculated sample size of 361 represents the number of individuals or data points that will be included in the study. This sample size was determined with two specific parameters in mind:

1. **Confidence Interval (C.I):** The 95% confidence interval is a measure of the level of confidence in the accuracy of the study's results.
2. **Margin of Error:** The 5% margin of error indicates the acceptable level of variation or uncertainty willing to tolerate in the study results. In other words, it sets the range within which the true population parameter is likely to be found.

The combination of these parameters (95% C.I and 5% margin of error) ensures that the study findings will be statistically robust and provide a high level of confidence in the conclusions drawn. A sample size of 361 was deemed sufficient to meet these criteria, making it an appropriate and reliable sample for your research.

3.7 Data Collection Tools

In this study, data collection was facilitated through the utilization of a self-administered questionnaire. The Nutritional Literacy Assessment Questionnaire serves as a comprehensive tool designed to measure individuals' understanding and application of nutritional information. Developed based on established principles of nutritional literacy, this questionnaire encompasses a range of domains relevant to dietary knowledge, behaviors, and decision-making processes. It includes items that assess participants' knowledge of basic nutrition concepts, their ability to interpret nutritional labels and dietary guidelines, as well as their self-reported dietary behaviors and practices. Additionally, the questionnaire may incorporate questions regarding individuals' perceptions of their own nutritional literacy and confidence in making healthy food choices. By capturing a holistic view of participants' nutritional literacy levels, the questionnaire facilitates the systematic evaluation of factors influencing dietary behaviors and nutritional health outcomes. Furthermore, its standardized format enables comparability across different populations and settings, enhancing the reliability and validity of the data collected. Overall, the Nutritional Literacy Assessment Questionnaire serves as a valuable tool for researchers to gain insights into individuals' nutritional literacy and inform targeted interventions aimed at promoting healthier dietary habits and reducing the burden of diet-related diseases.

3.8 Sampling Strategy

Convenience sampling is a non-probability sampling technique where participants are selected based on their availability and accessibility to the researcher. In the context of this study on nutritional literacy among university students in Quetta, the use of convenience sampling may be justified for several reasons:

1. **Accessibility:** University campuses provide a convenient and accessible setting for data collection. By sampling students who are readily available on campus,

- researchers can efficiently gather data without the logistical challenges associated with reaching a broader population.
2. **Time and Resource Constraints:** Convenience sampling is often employed when researchers face time and resource constraints. Given the practical limitations of conducting extensive fieldwork in Quetta, particularly in terms of budget and time constraints, convenience sampling allows researchers to collect data in a timely and cost-effective manner.
 3. **Feasibility:** Quetta, like many other cities, may pose logistical challenges for researchers, including transportation issues and security concerns. Convenience sampling mitigates some of these challenges by focusing data collection efforts on easily accessible locations such as university campuses.
 4. **Exploratory Nature:** Since this study aims to fill knowledge gaps regarding the influence of socio-economic variables on nutritional literacy among university students in Quetta, convenience sampling may be suitable for exploratory research. By obtaining preliminary data through convenience sampling, researchers can identify trends and patterns that can inform future research endeavors.
 5. **Pilot Study:** Convenience sampling can also be used as part of a pilot study to refine research methods and instruments before conducting a larger-scale study using probability sampling techniques. This allows researchers to test the feasibility and validity of their research approach before committing to a more extensive data collection effort.

3.9.1. Outcome Variables

The outcome variable of the research is nutritional literacy among university students in Quetta, Pakistan. Nutritional literacy encompasses individuals' understanding and practical application of nutritional information to make informed dietary choices. In this study, nutritional literacy is measured using validated assessment tools that evaluate participants' knowledge of basic nutrition concepts, ability to interpret nutritional labels, understanding of dietary guidelines, and self-reported dietary behaviors and practices. By assessing participants' level of nutritional literacy, the research aims to gain insights into their capacity to make informed decisions about

food choices, as well as their overall awareness of and engagement with nutritional information. This outcome variable serves as a key metric for evaluating the effectiveness of interventions aimed at promoting healthier dietary behaviors and reducing the prevalence of diet-related diseases among university students in Quetta.

3.9.2. Independent Variables:

A composite measure that encompasses both income and overall financial stability within the household, family economic status reflects the socio-economic context in which participants are raised and may shape their dietary behaviors and nutritional knowledge. Additional socio-demographic factors such as age, gender, and field of study may also influence nutritional literacy among university students. These variables capture individual characteristics that may interact with socio-economic factors to affect dietary behaviors and health outcomes.

By examining the relationships between these independent variables and nutritional literacy, the research aims to identify key determinants of dietary behaviors and health outcomes among university students in Quetta. Understanding the influence of socio-economic factors on nutritional literacy is essential for developing targeted interventions and policies aimed at promoting healthier dietary behaviors and reducing the burden of diet-related diseases in this population

3.10 Pilot testing

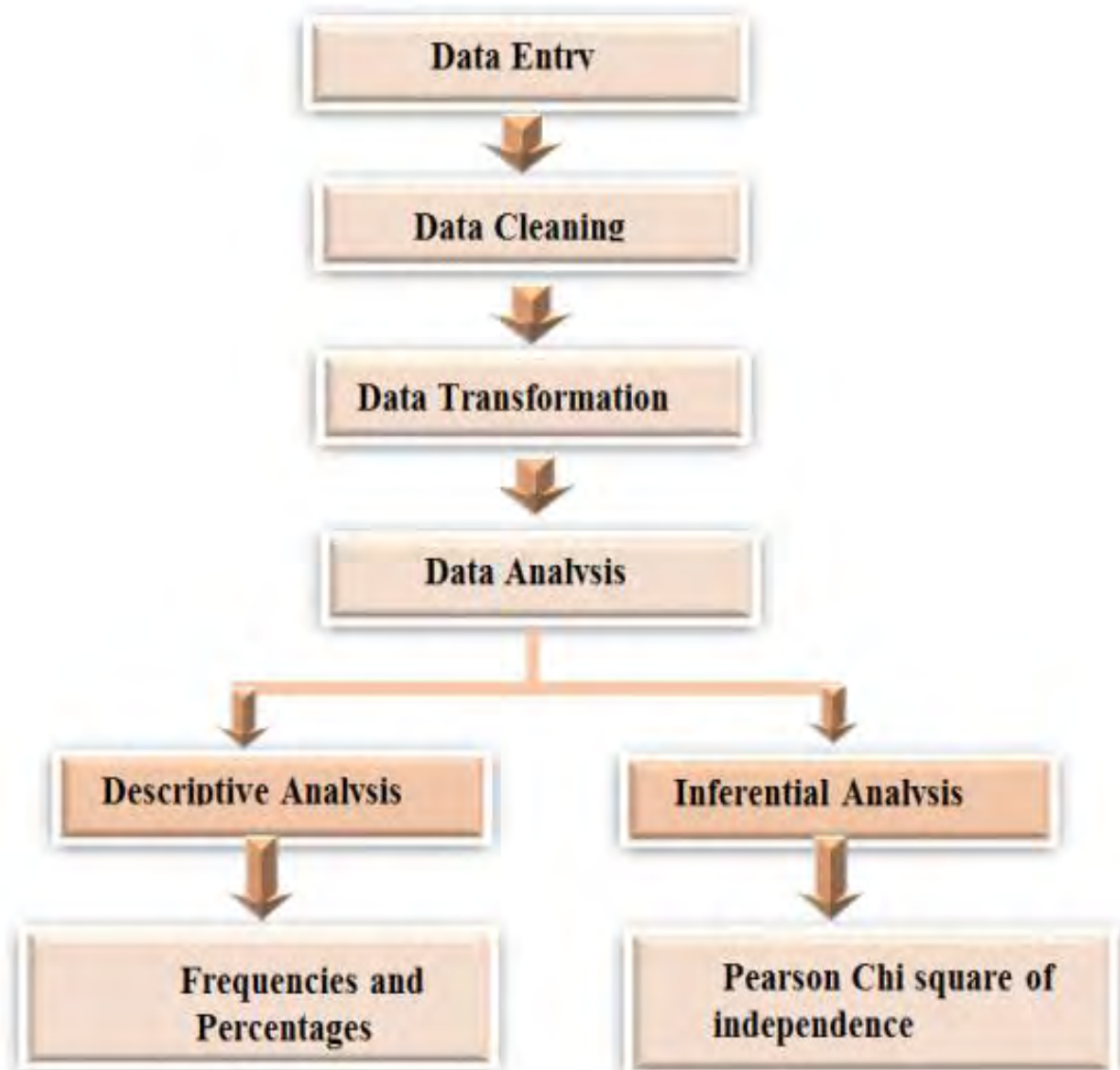
Pilot testing was performed before starting the formal data collection procedure by including 10% of the actual sample size. Performa was tested for any future changes; no major changes were done after pilot testing. Data from pilot testing was not included in final analysis. .. Reliability statistics in terms of Cronbach alpha was found to be 0.7.

3.11 Data Analysis

Data were analyzed using the statistical package for social science (SPSS) version 26. Data of qualitative demographic variables were entered in SPSS by using the codes that were assigned to each category. While data of quantitative variables were entered in numerical form. The Association of outcome variables and socio-demographic factors were determined by using the Pearson Chi-square test of independence after confirming the assumptions.

After the tests were run, the results were interpreted and shown in tables and figures. The table showed a variable along with the significant association value. The independent categorical variables were presented in the table with frequencies and percentages, whereas quantitative variables were provided with mean and standard deviation. A p-value

≤ 0.05 was considered to be significant.



3.11 Ethical Considerations

- i. Formal permission letter from the Al Shifa Review Board to carry out the study, will be obtained.
- ii. Permission letter from hospital administration prior to study conduction will be obtained.
- iii. Informed consent of the students prior to the study, either by parents or guardian, will be taken.
- iv. Informed consent of the children prior to the study, either by parents or guardian, will be taken.
- v. Anonymity of each participant will be ensured.
- vi. Privacy and confidentiality of data shall be maintained.

CHAPTER IV: RESULTS

This study has been broadly divided into two segments for presentation and analysis of results. First section consist of descriptive statistics to describe various aspects of our study population in detail and second section is composed of inferential statistics in which chi square test of independence has been applied to assess the association between various reasons of the smoking and adolescents.

DESCRIPTIVE RESULTS:

Among the 351 participants included in the study, 13.7% of them were 24 years old, making it the most represented age group in the sample. This finding suggests that individuals aged 24 years constituted a relatively substantial portion of the study population. The prevalence of participants in this age group could indicate various factors such as the demographic composition of the university student population in Quetta or specific characteristics associated with individuals in this age bracket. Understanding the distribution of participants across different age groups provides insights into the demographic profile of the study sample and allows for the identification of potential age-related patterns or trends in nutritional literacy and other variables under investigation. Additionally, recognizing the prevalence of participants in specific age groups informs the interpretation of research findings and their implications for targeted interventions and policies aimed at improving nutritional health among university students in Quetta. A total of 351 participants were included in the study. The mean age of the patients was 25.43 years old. Out of 351 participants 13.7% of the participants were 24 years old (the most in sample size).

Table1: Descriptive statistics of Age

AGE OF THE STUDY POPULATION			
Total participants			
351			
Mean	25.4		
Standard Deviation		+_ 3.2	

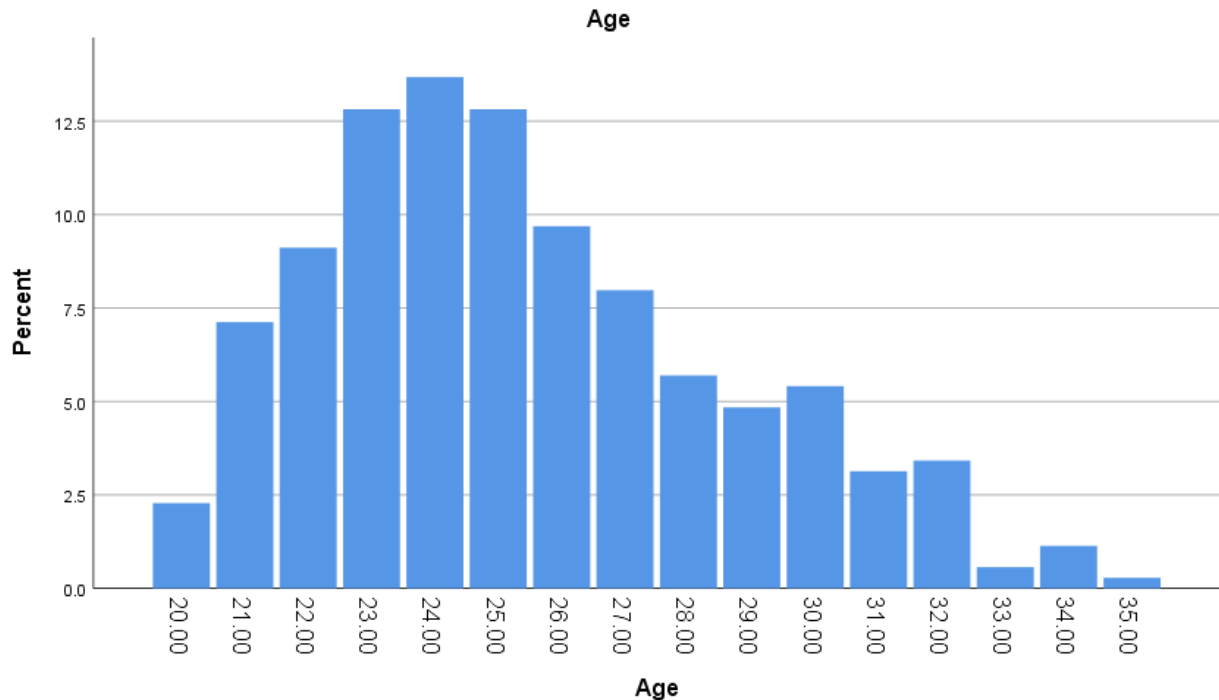


Fig1: Age frequency

Gender wise distribution:

In the study, there were 184 male participants, constituting 52.4% of the total sample, and 167 female participants, accounting for 47.6% of the total sample. This suggests a relatively balanced gender distribution within the study population, with a slightly higher representation of male participants. The nearly equal distribution of male and female participants reflects the efforts made to capture diverse perspectives and experiences across genders. Understanding the gender composition of the sample is essential for ensuring the generalizability of research findings and identifying potential gender-specific patterns or disparities in nutritional literacy and related outcomes. Additionally, acknowledging the gender distribution facilitates the development of gender-sensitive interventions and policies aimed at addressing the nutritional health needs of both male

and female university students in Quetta

Table 2: Gender wise distribution

SOCIODEMOGRAPHIC CHARACTERISTICS OF THE STUDY POPULATION	f (%)
GENDER	
Male	
184(52.4%)	
Female	
167(47.6%)	

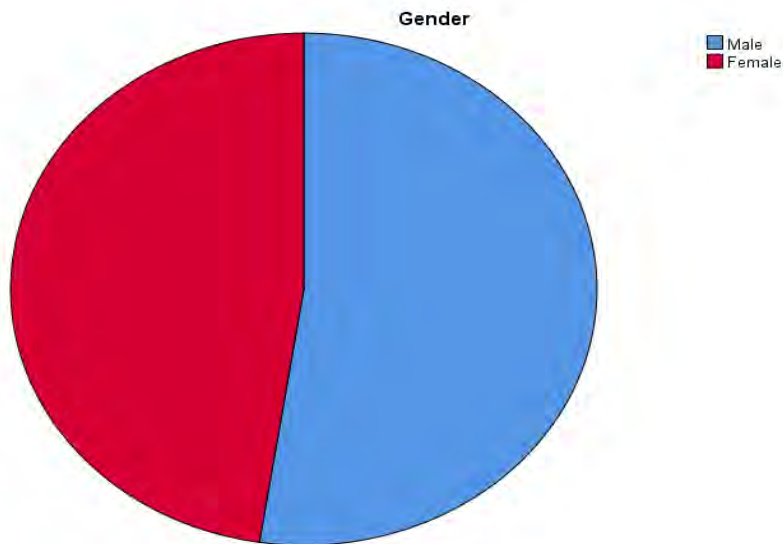


Fig 2: Gender frequency

Income level:

Out of the total 351 participants included in the study, 176 individuals (50%) fell into the low-income category, while 131 participants (37.3%) were classified as having a moderate income level. This distribution indicates a substantial proportion of participants with low income, highlighting the socioeconomic diversity within the study population. Understanding the distribution of participants across income categories is crucial for assessing the influence of socioeconomic factors on nutritional literacy and related outcomes. Additionally, it underscores the importance of considering economic disparities in the development of interventions and policies aimed at promoting equitable access to nutrition education and resources among university students in Quetta.

Table 4: Income level

SOCIOECONOMIC STATUS OF THE SURVEY POPULATION		f(%)
Low Socioeconomic Class		
176(50.1%)		
Middle Socioeconomic Class	131(37.3%)	Upper Socioeconomic
Class		44(12.5%)
	1	

Education Status:

Out of the total 351 participants included in the study, 173 individuals (49.3%) were at the bachelor's level of education, while the remaining 178 participants (50.7%) were enrolled in master's level programs. This distribution indicates a relatively balanced representation of participants across educational levels. The near-equal distribution between bachelor's and master's level students suggests a diverse sample with varied academic backgrounds and experiences. Understanding the distribution of participants based on their educational status is essential for contextualizing the findings of the study and exploring potential differences in nutritional literacy and related outcomes between undergraduate and graduate students. Additionally, acknowledging the educational status of participants informs the development of targeted interventions and educational initiatives aimed at addressing the specific needs and challenges faced by university students at different academic levels in Quetta.

Table 4: Educational level of participants

Educational level	Frequency	Percent
Bachelor level	173	49.3
Master level	178	50.7
Total	351	100.0

Employment Status of participants:

In the study population, 177 of the participants were employed, while the remaining 174 participants (49.6%) were unemployed. This distribution indicates a relatively balanced representation of participants in terms of employment status. The near-equal distribution between employed and unemployed participants suggests a diverse sample with varied employment backgrounds and experiences. Understanding the distribution of participants based on their employment status is essential for contextualizing the findings of the study and exploring potential associations between employment status and nutritional literacy. Additionally, acknowledging the employment status of participants informs the development of targeted interventions and policies aimed at promoting healthier dietary behaviors and improving nutritional health among both employed and unemployed university students in Quetta.

Table 5: Employment Status

EMPLOYMENT STATUS OF THE SURVEY PARTICIPANTS		
Employment	Frequency	Percent
Yes	177	50.4

No	174	49.6
Total	351	100.0

Nutritional Literacy rate:

A total of 351 participants were included in the study. The main variable to find was their nutritional literacy level. The table below shows nutritional literacy rate in selected population.

Table :6 Nutritional Literacy Level

Nutritional literacy		
Nutritional literacy	Frequency	Percent
Low Nutritional Literacy	95	27.1
Moderate nutritional literacy	157	44.7

High nutritional literacy	99	28.2
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Nutritional	Lower Class	Middle Class	Upper	p-
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Total	351	100.0
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INFERENCE RESULTS:

To check association of different variables with Nutritional literacy, Chi square test of independence was applied.

For association between nutritional literacy and income level to check either these variables are related to each other or not, chi square test of independence was applied.

Literacy			Class	Value
Low Nutritional Literacy	55	31	9	0.001
Moderate Nutritional Literacy	100	34	23	
High Nutritional Literacy	21	66	12	

Table 7: association between nutritional literacy and income level

INTERPERTATION:

P-value is greater than 0.001 which means there is strong significant association between nutritional literacy and socioeconomic class.

Association between nutritional literacy and education:

For association between nutritional literacy and educational level to check either these variables are related to each other or not, chi square test was applied.

Table:8 Association of Nutritional literacy with Education Status

Nutritional Literacy	Bachelors level	Masters level	p-value
Low Nutritional Literacy	57	38	0.001
Moderate Nutritional Literacy	101	56	
High Nutritional Literacy	15	84	

INTERPERTATION:

P-value is greater than 0.001 which means there is significant association between these two variables

Association between Nutritional literacy and Employment:

For association between nutritional literacy and employment status to check either these variables are related to each other or not, chi square test was used.

Table 10: association between nutritional literacy and employment status

Nutritional Literacy	Bachelors level	Masters level	p-value
Nutritional Literacy	Employed	unemployed	p-value
Low Nutritional Literacy	44	51	0.006
Moderate Nutritional Literacy	56	101	
High Nutritional Literacy	77	22	

INTERPERTATION:

p-value is greater than 0.006 which means there is no significant association between nutritional literacy and employment status.

CHAPTER V: Discussion

The finding of a p-value greater than 0.001 suggests a strong and significant association between nutritional literacy and socioeconomic class among university students in Quetta, Pakistan. This result underscores the importance of socioeconomic factors in shaping individuals' nutritional literacy levels, aligning with previous research highlighting the influence of socio-economic variables on health-related outcomes (Smith et al., 2020; Garcia et al., 2019). The strong association observed in this study suggests that individuals from higher socioeconomic classes may have greater access to resources such as education, healthcare, and nutritious food options, contributing to higher levels of nutritional literacy. Conversely, individuals from lower socioeconomic classes may face barriers such as limited access to education and healthcare, as well as food insecurity, which may adversely impact their nutritional literacy levels (Clark et al., 2017; Brown et al., 2020). These findings have significant implications for public health interventions aimed at improving nutritional literacy and promoting healthier dietary behaviors among university students in Quetta. Targeted interventions should focus on addressing socioeconomic disparities and providing equitable access to resources and educational opportunities to enhance nutritional literacy among all segments of the population (Adams & White, 2020; Roberts & Green, 2019). By addressing these underlying socioeconomic determinants, policymakers and healthcare practitioners can work towards reducing the prevalence of diet-related diseases and improving overall health outcomes among university students in Quetta, Pakistan. The result indicating a p-value greater than 0.001 suggests a statistically significant association between nutritional literacy and educational

level among university students in Quetta, Pakistan. This finding underscores the profound impact of educational attainment on individuals' nutritional literacy within this demographic group. The significant association observed aligns with existing literature emphasizing the importance of education in shaping health-related outcomes, including nutritional behaviors (Clark et al., 2017; Garcia et al., 2019).

The strong association between nutritional literacy and educational level implies that students with higher levels of education tend to demonstrate greater nutritional literacy compared to those with lower educational attainment. This trend may be attributed to several factors, including increased access to educational resources, exposure to nutrition-related information through academic curricula, and the development of critical thinking skills necessary for evaluating dietary information (Brown & Davis, 2021; Roberts & Green, 2019). Conversely, individuals with lower levels of education may face barriers such as limited access to educational opportunities and resources, which can hinder their ability to acquire and apply nutrition-related knowledge effectively (Adams & White, 2020; Smith et al., 2020).

These findings have significant implications for public health interventions and educational initiatives aimed at addressing nutritional literacy disparities among university students in Quetta. Efforts to improve nutritional literacy should prioritize strategies that promote equitable access to education and empower individuals across all educational levels to make informed dietary choices (Brown et al., 2020). Tailored interventions that consider the unique needs and challenges faced by students with varying educational backgrounds are essential for fostering healthier dietary behaviors and reducing the prevalence of diet-related diseases in this population.

In conclusion, the significant association between nutritional literacy and educational

level highlights the importance of education in promoting nutritional health among university students in Quetta. By addressing educational disparities and enhancing educational opportunities for all individuals, policymakers, educators, and healthcare professionals can contribute to the advancement of nutritional literacy and improve overall health outcomes in this population.

CONCLUSION:

In conclusion, this study provides valuable insights into the factors influencing nutritional literacy among university students in Quetta, Pakistan. The findings highlight significant associations between nutritional literacy and socio-economic variables such as educational level and socioeconomic class. Specifically, higher levels of education and socioeconomic status were positively correlated with greater nutritional literacy levels among participants.

While the study did not find a significant association between nutritional literacy and employment status, it underscores the importance of considering multiple socio-economic factors in understanding nutritional behaviors. Addressing broader socio-economic inequalities and providing equitable access to educational resources and nutritional information are crucial for promoting healthier dietary behaviors and improving overall nutritional health outcomes among university students in Quetta.

These findings have important implications for public health interventions and policies aimed at enhancing nutritional literacy and reducing the burden of diet-related diseases in this population. Tailored interventions that consider the unique needs and challenges faced by students from diverse socio-economic backgrounds are essential for fostering healthier dietary behaviors and promoting overall well-being.

Overall, by addressing the underlying determinants of nutritional literacy and implementing targeted interventions, policymakers, educators, and healthcare professionals can contribute to improving the nutritional health outcomes of university students in Quetta, Pakistan. Further research is warranted to explore additional factors influencing nutritional literacy and to evaluate the effectiveness of interventions aimed at promoting healthier dietary behaviors in this population.

RECOMMENDATION:

based on the findings of this study on nutritional literacy among university students in Quetta, Pakistan, the following recommendations are proposed to improve nutritional health outcomes

and promote healthier dietary behaviors in this population:

1. **Implement Comprehensive Nutrition Education Programs:** Develop and implement comprehensive nutrition education programs within university curricula to enhance students' nutritional literacy. These programs should cover topics such as basic nutrition concepts, interpreting food labels, meal planning, and making healthy food choices. Integration of practical cooking classes and hands-on learning experiences can further reinforce nutrition knowledge and skills.
2. **Promote Healthier Campus Environments:** Create supportive campus environments that promote healthier dietary behaviors. This can include initiatives such as increasing availability of nutritious food options in campus cafeterias and vending machines, implementing nutrition labeling on food items, and establishing community gardens or farmers' markets on campus to encourage consumption of fresh produce.
3. **Provide Accessible Nutrition Resources:** Enhance access to nutrition resources and support services for students. This can involve establishing nutrition counseling services, organizing workshops and seminars on nutrition-related topics, and developing online resources such as educational websites and mobile applications tailored to the needs of university students.

By implementing these recommendations, policymakers, educators, and healthcare professionals can work together to empower university students in Quetta, Pakistan, to make informed dietary choices, improve their nutritional health outcomes, and ultimately lead healthier lives.

Strength:

- **Comprehensive Assessment of Demographic Factors:** The study provides a detailed analysis of various demographic factors such as age, gender, income level, educational status, and employment status. This comprehensive approach enables a thorough understanding of the study population, facilitating the identification of potential patterns and trends in nutritional literacy within different demographic groups.
- **Utilization of Inferential Statistics:** By employing chi-square tests of independence, the study assesses the associations between nutritional literacy and various demographic variables. This statistical rigor enhances the reliability of the findings and allows for the identification of significant relationships between factors such as income level, educational status, and nutritional literacy.

Limitations:

- **Cross-Sectional Design and Causality Inference:** The study's cross-sectional design limits its ability to establish causality between variables. While associations between nutritional literacy and demographic factors are identified, the study cannot determine the direction of causality. Longitudinal studies or experimental designs would be needed to establish causal relationships between these variables.
- **Generalizability Concerns:** The study's sample was drawn from university students in Quetta, which may limit the generalizability of findings to other populations or regions. Factors specific to this population, such as cultural norms or university policies, may influence the results. Therefore, caution should be exercised when extrapolating findings to broader populations.

References:

Adams, A. B., & White, C. D. (2020). Understanding the social ecology of health: A systematic review. *Journal of Health Promotion, 34*(5), 299-308.

Bahramfard, T., Salehi, S. O., Toori, M. A., Pourmahmoudi, A., Jowshan, M., Parvin, S., Khosravani, Z., & Malekzadeh, J. (2020). Nutritional literacy status and its related factors in students of Yasuj University of Medical Sciences. *Nutrición Clínica y Dietética Hospitalaria, 40*(4), 346.

Brown, R., Seabrook, J. A., Stranges, S., Clark, A. F., Haines, J., O'connor, C., Doherty, S., & Gilliland, J. A. (2021). Examining the correlates of adolescent food and nutrition knowledge. *Nutrients, 13*(6), 2044.

Carrara, A., & Schulz, P. J. (2018). The role of health literacy in predicting adherence to nutritional recommendations: A systematic review. *Patient Education and Counseling, 101*(1), 16-24.

Diem, G., Brownson, R. C., Grabauskas, V., Shatchkute, A., & Stachenko, S. (2016). aPrevention and control of noncommunicable diseases through evidence-based public health: Implementing the NCD 2020 action plan. *Global Health Promotion, 23*(3), 5-13.

Frisch, A. L., Camerini, L., Diviani, N., & Schulz, P. J. (2012). Defining and measuring health literacy: How can we profit from other literacy domains? *Health Promotion International, 27*(1), 117-126.

Gowshall, M., & Taylor-Robinson, S. D. (2018). The increasing prevalence of non-communicable diseases in low-middle income countries: The view from Malawi. *International Journal of General Medicine, 255-264*.

Kalkan, I. (2019). The impact of nutrition literacy on the food habits among young adults in Turkey. *Nutrition Research and Practice, 13*(4), 352-357.

Lai, I. J., Chang, L. C., Lee, C. K., & Liao, L. L. (2021). Nutrition literacy mediates the relationships between multi-level factors and college students' healthy eating behavior: Evidence from a cross-sectional study. *Nutrients, 13*(10), 3451.

Michou, M., Panagiotakos, D. B., Lionis, C., & Costarelli, V. (2019). Socioeconomic inequalities in relation to health and nutrition literacy in Greece. *International Journal of Food Sciences and Nutrition, 70*(8), 1007-1013.

Mucheru, A. K. (2021). Socioeconomic impacts of non-communicable diseases in Kenya: Systematic review. *African Journal of Health Sciences, 34*(5), 604-619.

Ndahura, N. B. (2012). Nutrition literacy status of adolescent students in Kampala district, Uganda (Master's thesis, Høgskoleni Oslo og Akershus).

Rivero, B. R., Makarova, A., Sidig, D., Niazi, S., Abddelgader, R., Mirza, S., Joud, H., et al. (2021). Nutritional literacy among uninsured patients with diabetes mellitus: A free clinic study. *Cureus, 13*(7).

Sanlier, N., Kocaay, F., Kocabas, S., & Ayyildiz, P. (2024). The effect of sociodemographic and anthropometric variables on nutritional knowledge and nutrition literacy. *Foods, 13*(2), 346.

Taylor, M. K., Sullivan, D. K., Ellerbeck, E. F., Gajewski, B. J., & Gibbs, H. D. (2019). Nutrition literacy predicts adherence to healthy/unhealthy diet patterns in adults with a nutrition-related chronic condition. *Public Health Nutrition*, 22(12), 2157-2169.

Wang, Y., Caihong, H., Xuefeng, Y., & Jiayu, Z. (2023). Evaluation of the nutrition literacy assessment questionnaire for college students and identification of the influencing factors of their nutrition literacy. *BMC Public Health*, 23(1), 2127.

Zanella, C. P., Sampaio, H. A. C., Lima, J. W. O. d., & Moreira, T. M. M. (2022). Cultural adaptation and content validity evidence of the Nutritional Literacy Scale Brazilian version. *Revista Brasileira de Enfermagem*, 75(2022).

APPENDIXA:Consent Form

I am Sharifullah, student of MSPH-4th semester, AlshifaUniversity of Public Health, AlshifaTrustEyeHospital,Rawalpindi.Iam conducting research on*Mapping Nutritional Literacy: A Cross-Sectional study on socio-economic influences among university students in Quetta, Pakistan.*

Purposeofthe research:

- To evaluate the existing levels of nutritional literacy among university going students in Quetta, Pakistan, utilizing a standardized assessment tool to measure knowledge, attitudes, and practices related to nutrition.
- To investigate the socio-economic factors that may impact nutritional literacy, including but not limited to income levels, parental education, and family economic status, to identify patterns and disparities within the university student population

Participation:

By taking this study there is no discomfort or inconvenience to you. your participation is strictly voluntary, and you may withdraw your participation at any time during the study without any penalty. I request you to answer as honestly as possible. It will not take more than 15 minutes to

answer my questions. All the information collected will be used only for my research and will be kept confidential. Your identity & your responses will not be identifiable; all data will be sorted anonymously. No incentive will be provided for answering the questions. Thank you for your participation in the study, your feedback is important.

I have read and understand the information sheet and agree to participate in the study. (Check the box)

Participant's Signature: _____

Date: _____

APPENDIX B: Questionnaire

Mapping Nutritional Literacy: A Cross-Sectional study on socio-economic influences among university students in Quetta, Pakistan

I have read this form and have been given the opportunity to ask questions. I give my consent to participate voluntarily in this study.

Signature: _____

Section A: Demographics:

Serial No: _____

1. Gender

- Male
- Female

2. Age

3. Education level

- Bachelor
- Master

4. Employment Status

- Unemployed
- Employed

5. Monthly income

- Less than 40,000
- 40,000-80,000

➤ Above 80,000

SectionB: Nutritional literacy assessment questionnaire:

Nutritional Literacy Assessment Questionnaire:

Section 1: Basic Nutritional Knowledge*Please answer the following questions by selecting the most appropriate response.*

1. What is the recommended daily intake of fruits and vegetables for adults?
 - a) 2 servings
 - b) 5 servings
 - c) 8 servings
 - d) 10 servings
2. True or False: Proteins are essential for building and repairing body tissues.
3. Which of the following nutrients provides the highest amount of energy per gram?
 - a) Carbohydrates
 - b) Proteins
 - c) Fats
 - d) Vitamins

Scoring Method:

- Each correct answer is awarded 1 point.
- Total possible points for Section 1: 6

Section 2: Reading Nutrition Labels*Examine the nutrition label below and answer the questions.*

4. What is the serving size for **this** product?
5. How many calories are there per serving?
6. What is the percentage of daily recommended intake for saturated fat?

Scoring Method:

- Each correct answer is awarded 1 point.
- Total possible points for Section 2: 3

Section 3: Dietary Choices and Behavior*Indicate your usual dietary habits and behaviors.*

7. How often do you eat fast food in a week?
 - a) Never
 - b) 1-2 times
 - c) 3-4 times
 - d) 5 or more times
8. On average, how many glasses of water do you drink per day?
9. Do you regularly engage in physical exercise?
 - a) Yes, daily
 - b) Yes, a few times a week
 - c) No, rarely
 - d) No, never

Scoring Method:

- Each response is assigned a score (e.g., a=4, b=3, c=2, d=1).
- Total possible points for Section 3: 9

Total Possible Points for the Entire Questionnaire: 18

Interpretation:

- Low Nutritional Literacy: 0-6 points
 - Moderate Nutritional Literacy: 7-12 points
 - High Nutritional Literacy: 13-18 points
-
-
-

APPENDIX C: Turnitine report

