

Dietary Intake, Nutritional Status and Academic Achievements of School Children: A study Protocol

Bishnu Kumar Adhikari

PhD Scholar, Graduate School of Education, Tribhuvan University, Kirtipur, Nepal

sheshnathpra@gmail.com

ORCID iD: <https://orcid.org/0009-0009-7956-6747>

Surendra Giri

Professor, Central Department of Education

Tribhuvan University, University Campus, Kirtipur, Kathmandu, Nepal

surendra.giri2010@gmail.com

ORCID iD: <https://orcid.org/0009-0009-7956-6747>

Yadu Ram Upreti

Assistant professor, Central Department of Education

Tribhuvan University, University Campus, Kirtipur, Kathmandu, Nepal

yaduram.upreti@tucded.edu.np

ORCID iD: <https://orcid.org/0000-0002-2705-1209>

Abstract

Dietary intake and nutritional status of children have a big impact on their academic performance and cognitive development. This protocol of the study aims to examine the association among dietary intake, nutritional status, and academic achievement of vegetarian and non-vegetarian school children with reference to Social Cognitive Theory (SCT) and the Health Belief Model (HBM). A school based cross-sectional study is conducted among 422 children aged 6-14 years. Proportionate stratified random sampling technique is employed to ensure representativeness in vegetarian and non-vegetarian school children. Dietary intake patterns are assessed using pre-tested structured interview schedule incorporating 24hour dietary recall (24HDR) and a validated food frequency questionnaire (FFQ). Nutritional status is determined using WHO anthropometric standards. Academic achievement is obtained from school record. Statistical analysis determines association between variables through SPSS software. Collected data are analyzed and interpreted using bivariate (chi-square, t-test, Pearson r) and multivariate (multinomial logistic regression) levels. Therefore, this protocol provides the insights into the overall linkage of foods, nutrients and academic success. This study is crucial to describe the explanatory power of SCT and HBM constructs. The data can then be used to make school nutrition policy, health education curriculum, teacher and parent engagement, school level peer dynamics and related studies.

Keywords: *dietary intake, nutritional status, academic achievement, school children*

Introduction

Dietary intake is crucial for growth, development and overall academic performance in children. As dietary intake patterns evolve due to cultural, environmental, ethical and

health consideration, an increased number of families are adopting vegetarian food items for their children (Benton, 2010). While vegetarian diet offers various health benefits including reduced risk of obesity, cancers and cardiovascular disease (Melina et al., 2016). Globally, non-communicable diseases are becoming the main cause of illness and death. With rising trends in non-communicable diseases (NCDs). Nepal is currently dealing with a double burden of NCDs and communicable diseases and malnutrition (Gyawali et al., 2020). Malnutrition is linked to dietary intake, which is one of the major public health problems in developing countries like Nepal (Adhikari et al., 2024).

Despite growing awareness of the importance of essential nutrients intake in children, it has not been a central focus of educational agenda (Clarke, 2020). Even though, there is a deep relationship between nutritional status and educational performance of children both direct and indirect, because poor nutrition in children is leading reason for low enrolment, early dropout, high absenteeism and poor classroom performance (Burchi, 2012).

A study revealed that well-planned vegetarian diets can meet the nutritional needs of children. However, there is the risk of deficiencies in iron, vitamin B12, calcium, zinc and omega-3 fatty acids, which are available in animal-based foods (Gray et al., 2018). These nutrient gaps may have implications for both nutritional status and academic achievement. Inadequate nutritional status particularly iron deficiency is linked to poorer academic achievement and reduces the attention to study in children (Tia et al., 2025).

Incontrast, some studies claim that vegetarian children have better diet quality overall. More intakes of fruits, vegetables, dietary fibre and whole grains improve health outcomes and concentration in children (Clarys et al., 2014). Although, there is no accurate, national data for Nepal. The growing trend of vegetarian diets and demand for plant-based food product appears to be increasing (Gan et al., 2018). Moreover, a plant-based diet patterns have a favorable impact on behavior and concentration, that are indirectly related with academic performance (Fynn-Sackey & Abdul Salam, 2015). Another study revealed that dietary intake significantly impacts on academic performance of children, which is a growing area of research especially in developing country (Adhikari et al., 2025b).

Contradictorily, a study by Asmare et al. (2018a) tells that, the association between nutritional status and educational performance among school-age children in developing countries have not been recognized well. Even though, nutrition is also a vital component of human health, life, and brain development through the entire lifespan.

Despite these insights, there remains a notable gap in research comparing the nutritional status and academic achievement of vegetarian and non-vegetarian children. Most studies to date are region-specific. They do not offer comprehensive conclusion leaving a gap in understanding how dietary patterns impact health and academic achievement in children (Pareek & Ayesha, 2015). Therefore, there is a paucity of research on the nutritional status and academic achievement of vegetarians and non-vegetarian school children. Only a few recorded penalties for vegetarian children exist (Simeone et al., 2022). So, it is also needed to study healthy eating behaviors among school children (Haines et al., 2019). Food gives the brain energy and helps it learn better. Students' attention-concentration, memory, and academic performance will all be improved if their nutritional status is improved (Gajre et al.,

2008). Although studies are available for specific regions and studies, there is no reliable data or enumeration regarding the accurate percentage of vegetarians and non-vegetarians and their nutritional status (Koirala, 2023). Similarly, another study claimed empirical evidence indicates that anthropometric indicators such as stunting and underweight are closely associated with lower academic Achievement (Asmare et al., 2018). Furthermore, eating breakfast, eating meals often, and eating a diverse diet are all significant markers of cognitive performance and academic success (Faught et al., 2017). Now overweight and obesity in children are becoming more common, but undernutrition, particularly stunting and wasting, has decreased in children (Nikalansooriya et al., 2025).

From the above reviewed literatures, it is argued that existing research has explored the link between general nutrition and academic success, there is limited study focused on comparing these two dietary groups. This study seeks to address this gap by assessing the dietary intake, nutritional status and academic achievement of vegetarian and non-vegetarian children and establishing their association. Therefore, this study aimed to examine the connection between dietary intake, nutritional status, and academic achievement in school children using Social Cognitive Theory and the Health Belief Model.

Statement of the Problem

Inappropriate food intake habits are the primary causes of malnutrition and cardiovascular diseases (Bede et al., 2020). Fast food and excessive food consumption are major contributors to global health problems and malnutrition (Adhikari et al., 2025a). On the basis of the Indian Academy of Pediatrics' classification, 55.3% boys and 35.8% girls fall under first-degree malnutrition based on weight for age, 23.07% boys and 46.3% girls fall under second-degree malnutrition, and 7.2% girls fall under third-degree malnutrition (Bhandari & Shrestha, 2012; Koirala, 2019). Therefore, malnutrition and unhealthy dietary habits have been a major public health concern among school children. Even though, Nepal has made progress in reducing child undernutrition. Even though, stunting, underweight, and wasting are still significant nutritional problems among children (Acharya et al., 2024; Adhikari et al., 2023).

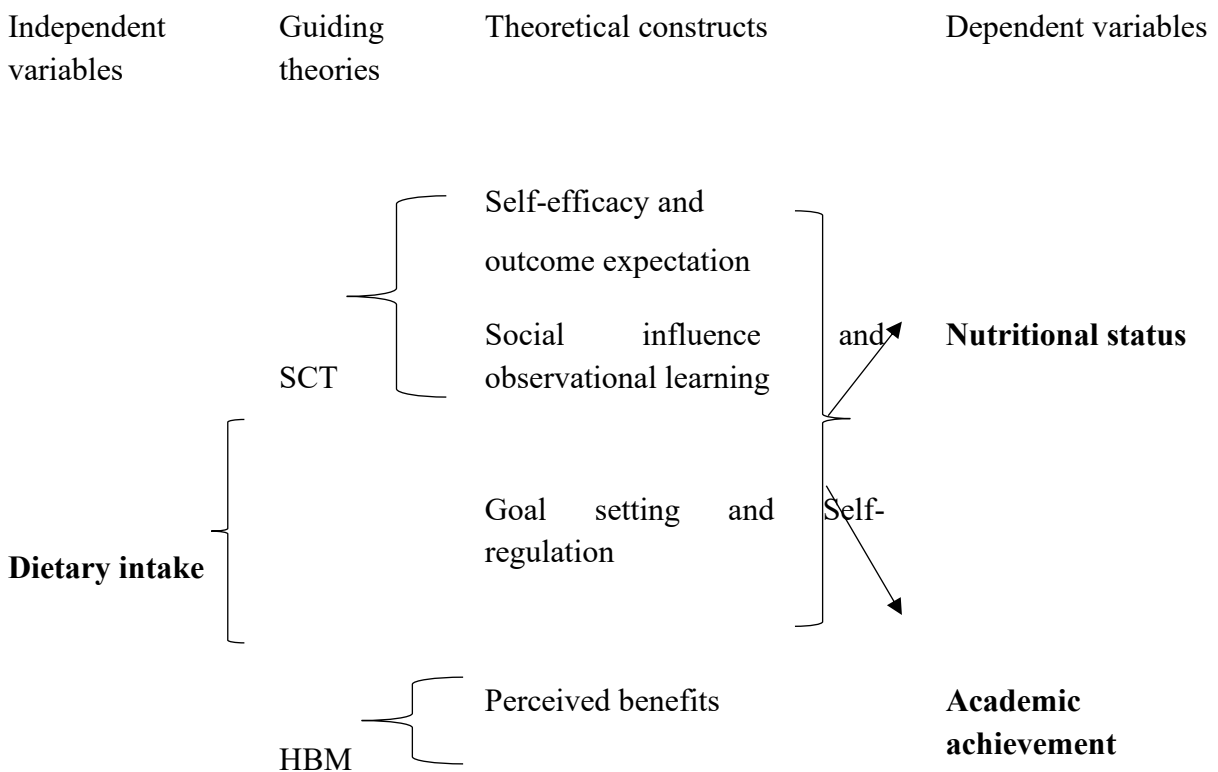
Existing studies in Nepal mainly focus on general malnutrition and rarely examine how vegetarian and non-vegetarian dietary patterns influence nutritional status and academic achievement among school-age children (Banstola & Acharya, 2015; Koirala, 2023). Furthermore, there is limited theory-based research linking dietary behavior, nutrition, and educational outcomes in Nepal.

The present study addresses these gap by incorporating SCT and HBM constructs as key explanatory variables, enabling the analysis of why children's dietary patterns take the forms they do and through what psychological and social pathways dietary behavior translates into nutritional and academic outcomes. Therefore, this study generates evidence on the relationship between dietary patterns, nutritional status, and academic performance among Nepalese school children, which may support evidence-based school health and nutrition policies.

Theoretical Framework

While reviewing the different types of theory in light of overall goals of this study, the Social Cognitive Theory (SCT) developed by Bandura (1982), appears to be applicable as a theoretical referent. The SCT concept of reciprocal determinism is particularly useful because determinants of nutritional foods and learning behaviors can be categorized to illustrate upon classifying dietary pattern as a health and learning behavior of interest. Interaction among personal and environmental factors that can be examined to increase good dietary intake and learning behaviors of children (Gaines & Turner, 2009). SCT is used to explain the health behavior of school children. Children's motivations and actions are assumed to be based on three types of expectations such as situational outcomes, action outcomes, and perceived self-efficacy. There is also a clear causal order between these three types of expectations. The first optimistic belief predicts actual behavioral performance and the second how people frequently plan to act in ways that they believe under their control (Abraham & Sheeran, 2005). Therefore, the SCT might fit for shaping food intake and learning behavior in children. Some components of SCT such as self-efficacy and outcome expectation, social influence and observational learning, self-regulation and goal setting. Another Health Belief Model is also the most widely used model of health. When examining what encourages and discourages people from taking part in healthy activities, the HBM is useful to identify perceived benefits and barriers in children by focusing on children's food choices and academic achievement. It also attempts to predict health behaviors (Kiely et al., 2022).

Figure1: Theoretical Framework



Perceived barriers

Figure 1: demonstrates the theoretical framework through the integration of Social Cognitive Theory (SCT) and the Health Belief Model (HBM). The focus of this framework is on how psychological and behavioral outcomes are influenced. The constructs of SCT help to explain the influence of self-efficacy, outcome expectations, and social influence, as well as the role of observational learning, and the influence of goal setting and self-regulation on a children's dietary intake (Bandura, 1986). The perceived benefits and perceived barriers of HBM help to explain the outcome of a person's decision about which factors cumulatively influence the nutritional status and academic achievement (Rosenstock, 1974). It can be inferred that a combination of cognitive and believing processes as well as social and behavioral processes shape the factors of health and education outcomes.

Among the various theories, SCT and HBM are used as theoretical referent to identify the self-efficacy, outcome expectation, social influence, observational learning, self-regulation and goal setting from SCT and perceived benefits and perceived barriers from HBM in this study.

Research Objectives

The general objective of this study is to assess the dietary intake, nutritional status, and academic achievement of school children and to examine the association among these variables with reference to Social Cognitive Theory and the Health Belief Model. The specific objectives are the following:

- i. To identify the dietary intake, nutritional status, and academic achievement of school children,
- ii. To examine the association of dietary intake with nutritional status and academic achievement.
- iii. To compare nutritional status and academic achievement between vegetarian and non-vegetarian children.
- iv. To determine the association among dietary pattern, nutritional status, and academic achievement of school children.

Research Hypothesis

This study has considered the following hypotheses:

H01: There is no significant association between dietary intake and nutritional status (HAZ/BAZ) among school children.

H02: There is no significant association between dietary intake and academic achievement (GPA) among school children.

H03: There is no significant difference in nutritional status (HAZ/BAZ) between vegetarian and non-vegetarian children.

H04: There is no significant difference in academic achievement (GPA) between vegetarian and non-vegetarian children.

H05: There is no significant association between nutritional status (HAZ/BAZ) and academic achievement among school children.

Methods and Procedures

Methods and procedures describe the research technique and the sequential process used to conduct a study, including research design, data collection, analysis, and ethical concerns, in order to guarantee that a study is systematic and reliable (Creswell, 2013; Kothari, 2011).

Research Design

A school based quantitative cross-sectional study design is employed to assess dietary intake, nutritional status, and academic achievement of school children at a single point of time (Creswell, 2013). It also provides a broad image of the study topic for more analysis (Subedi, 2016). The quantitative data are utilized because it is hard, rigorous, credible, and scientific, which can be used to test existing theories (Alharahsheh & Pius, 2020). This quantitative cross-sectional research design is well-suited for collecting data at a single point in time, offering a snapshot of the dietary intake, nutritional status and academic achievement of school children (Kesmodel, 2018).

Study Area and Population

Kathmandu district has been selected as a study site, which holds the diverse sociocultural pattern, encompassing both urban and rural regions with subtropical climates. It covers ethnically diverse food traditions, local festivals and different social norms (Tjon-A-Ten, 2025). Therefore, the six schools from Kathmandu are selected purposively, where vegetarian children are found.

The target population is vegetarian specially lacto-vegetarians (individuals who follows a plant –based diet that includes dairy products but excludes meat, fish, poultry and eggs) and non-vegetarian (who consume meat fish and eggs as well) school children of 6 to 14 years. This age group is selected because it is characterized by rapid physical growth and emerging cognitive independence. The reason of choosing this age is that Children of 6-14 years age are frequently underrepresented in Nepal’s nutrition surveillance data (Saavedra & Prentice, 2023). Especially the age of 10-12 years group reflects on their nutritional and academic problem as well as food faddism they are at high risk of inadequate nutrition, eating disorder, obesity and underweight problem (Hamulka et al., 2024).

Key methods are included such as survey using pre-tested interview schedule for dietary intake, demographic profile, psychosocial and 24hour dietary recall data. Similarly, validated anthropometric instruments are used for height and weight measurement and official grade point average (GPA) records are obtained from school administration. The students who meet the eligibility criteria are included as the study population. The vegetarian

and non-vegetarian school children of 6-14 years are included. Similarly, children with underlying medical conditions or those on specific therapeutic diets are excluded, and subjects refusing to provide informed consent or the students who deny to participate in this study are excluded.

Since this study is focused on dietary intake pattern of students (vegetarian and non-vegetarian practices at home and school), school midday meal practices do not necessarily affect to select the required respondents to this study. Hence, the school offering no school meal practice is also considered as the sample school to this study.

Sampling Procedures

The researcher (first author) visits the schools with predominantly vegetarian and non-vegetarian populations in the Kathmandu district. Subsequently, three schools from vegetarian dominant schools and three schools from non-vegetarian dominant schools are selected purposively. A list of students aged 6 to 14, along with their roll numbers is obtained from the selected schools. The researcher then calculates necessary sample from selected groups and schools through proportionate stratified random sampling. After that the necessary samples of students are selected from the chosen classes of six schools (Sch1, Sch2, Sch3, Sch4, Sch5, and Sch6) using the lottery method of simple random sampling without replacement. The self-reported vegetarian and non-vegetarian both boys and girls aged 6 to 14 are included as sample in this study.

Sample Size

The sample size is calculated using the standard statistical formula given by Cochran (1963) (as cited in Sharma & Adhikari, 2022; Sheema et al., 2016). So, the following formula is used to calculate the sample size for this study.

$$n = \frac{z^2 pq}{e^2}$$

where,

n= sample size for infinite population.

Z= the standard normal deviation, set at 1.96 which corresponds to 95% confidence level

P= population proportion (assumed to be 50% (0.5)).

q= (1-p).

The z score is determined based on the confidence level. 95% confidence level is considered; then the z value is 1.96.

e= margin of error/ acceptance range of error.

Generally, we take margin of error as 5%. So, e= 0.05.

So, the formula is

$$n = \frac{z^2 \times p \times (1 - p)}{e^2}$$

$$n = \frac{1.96^2 \times 0.5 \times (1 - 0.5)}{(0.05)^2}$$

$$n = \frac{3.8416 \times 0.5 \times 0.5}{0.0025}$$

$$n = 384.16 \text{ or}$$

$n = 384$ With addition of non-response rate of 10% sample size becomes, $384 + 10\% \times 384 = 422.4 \approx 422$. Therefore, adjusted sample size is 422.

For proportionate stratified random sampling, the number of samples from non-vegetarian strata is calculated by this formula;

$$\text{Sample size of non - veg} = \frac{\text{Population of non - veg children}}{\text{Total population of study children}} \times 422$$

$$\text{Sample size of non - veg} = \frac{621}{1058} \times 422$$

$$\text{Sample size of non - veg} = 247.69$$

So, sample size of non - veg = 248

Similarly, the number of samples from vegetarian will be the following;

$$\text{Sample size of veg} = \frac{\text{Population of vegetarian children}}{\text{Total population of study children}} \times 422$$

$$\text{Sample size of veg} = \frac{437}{1058} \times 422$$

So, sample size of vegetarian children = 174

Data Collection Tool and Instrument

The following instrument and tools are used for the data collection which is shown in table 1.

Table 1: Data Collection Tools and Instruments

Tools	Using purpose
Interview Schedule: A well designed and pretested set of interview schedule.	To collect socio-demographic and dietary pattern related data
24hour dietary recall (24HDR): A well-designed food frequency table along with 24-hour dietary recall sheet.	To collect the food consumption pattern and nutrient intake by the children within 24hour

Instruments	Using purpose
Stature meter: A well calibrated stature meter, measuring up to 200 cm with least count of 0.1 cm.	To measure the height of children
Digital weighing balance: A digital weighing balance, measuring up to 180 kg with least count of 0.1 kg.	To measure the weight of children.

Table 1 shows that the study uses specific data collection instruments that have been tested and standardized in order to ensure the reliability and validity of collected data. A semi-structured interview schedule is used to collect socio-demographic information and the eating habits of the subjects under investigation, which is highly encouraged in nutrition research (Gibson, 2005). The anthropometric measurement consists of height using a calibrated stature meter with a measurement of 0.1cm, and weight using an electronic weighing balance that measures up to 0.1 kg. This technique of data collection is commonly used in assessing growth in children (WHO, 2007). Furthermore, a 24-hour dietary recall aided by food frequency list is used to measure dietary intake of the children.

In nutshell, a well-designed and pretested set of interview schedule is used to collect the data on children's socio-demographic variables, dietary practices, 24 hour dietary recall and nutrition related knowledge of the targeted respondents. It also includes height, weight and Grade Point Average (GPA) of children. The interview schedule is developed in the local (Nepali) language first, then, it is translated into the English language. The prepared interview schedule and anthropometric instrument are pre-tested in similar respondents of Lalitpur district. Pretesting is done to check accuracy and consistency in the interpretation, clarity of the question, and to identify the ambiguous ones. After pretesting the ambiguous and wrongly interpreted questions are removed and the interview schedule is revised as per the results of the pretesting.

Validity and Reliability

The content validity of the interview schedule is established by the Delphi technique, which involves a panel of experts anonymously answering the interview schedule question in multiple rounds to obtain a consensus on complex themes. It reduces bias and the effect of influential people by avoiding direct confrontation (Jain et al., 2024; Majka, 2024).

The experts/reviewers assessed the relevance, clarity and comprehensiveness of each item related to the study's objectives and theoretical framework. Face validity is assessed during the pretesting phase. Construct validity is supported by alignment of SCT and HBM items with previously validated theoretical constructs from the literature (Abraham & Sheeran, 2005; Conner & Norman, 2005). Internal consistency reliability of multi-item SCT and HBM subscales are assessed using Cronbach's alpha with acceptable value. Anthropometric reliability is ensured through averaging three measurements. The Research

Center for Educational Innovation and Development (CERID) provides the instruments validated by the department of food technology and quality control of Nepal. The validity of WHO AnthroPlus z-score calculation is established by the WHO reference standards on which the software is based (WHO, 2007).

Data Collection Technique/Procedure

First of all, researcher (first author) visits schools and their principals with request letter from Graduate School of Education (GSE), TU. Then, he shares the background information as well as the purpose of study with the school administration, health education teachers and school nurse. Then, the data are collected by considering the following steps

Step 1: In this step, the researcher meets the respondents to collect data related with socio-demographic profile and dietary intake by building rapport. The data related to dietary intake are taken by using multiple-choice questions of interview schedule specially designed for the targeted children.

All questions are read to respondent by the interviewer. Then the interview schedule is filled. Health education teacher helps the researcher in this step.

Step 2: In this step, the researcher involves in the height and weight measurement of children using validated instrument from the help of school nurse and staffs of concerned schools. Instruments are borrowed from CERID which are validated by Department of Food Technology and Quality Control of Nepal (Acharya et al., 2024) .

Weight: Using a standard weight machine, the weight is recorded in kilograms(kg). The children are requested to have on the barest minimum of apparel and shoeless. Prior to taking the weight, the weighing scale's zero mark is examined, and any necessary corrections is made. For the final measurements, averages of the three values are obtained.

Height: A standard stature-meter is used to measure the height of school children. The children for the height measurement is instructed to stand upright, without shoes, on a flat platform, and with their heads turned toward the front.

Steps 3: In this step, the GPA of current year's annual examination marks is obtained for analyzing achievement of school children. The GPA is taken from the school records with the help of administration.

Data Management and Analysis

The researcher checks the prepared interview schedule for internal consistency and completeness prior to entry. Before being imported into Microsoft Excel, the data is coded using a preset codebook. The excel dataset is cleaned using range checks, skip pattern verification, and outlier screening. Cleaned data are transferred to SPSS (Version 26.0) for statistical analysis. Before being merged with the SPSS dataset, anthropometric data are separately entered into WHO AnthroPlus in order to compute the z-score. The SCT and HBM Likert-scale responses (originally five-point: strongly disagree to strongly agree) are split into "disagree" (1–3) and "agree" (4–5) categories for the multinomial logistic regression in compliance with standards for chi-square analysis in smaller sub-group cells (Creswell, 2013; McHugh, 2013).

Univariate Analysis

Categorical variables are displayed as frequencies (n) and percentages (%). Continuous data are reported as means and standard deviations (SD) or medians and interquartile ranges (IQR) when distributions are not normal. Nutritional status indicators (HAZ, BAZ) are classified by WHO as means, SDs, and category distributions. Academic achievement (GPA) is summarized using the mean, standard deviation, and categorical distribution per grade band.

Bivariate Analysis

The Pearson Chi-square test (χ^2) is used to assess the association between categorical independent variables (dietary pattern, sociodemographic attributes, SCT/HBM components) and categorical outcomes (BMI percentile category, stunting category, GPA category). Fisher's exact test is applied when expected frequencies is less than five in more than 20% of cells. A two-sample independent t-test will be used to compare the continuous outcomes (HAZ, BAZ, and GPA) between the vegetarian and non-vegetarian groups. When Levene's test shows uneven variances, Welch's correction is applied. Pearson's product-moment correlation coefficient (r) is used to assess the linear relationships between continuous variables (BMI-for-age z-score and GPA), stratified by dietary group. For all bivariate tests, a two-tailed significance level of $p < 0.05$ is used.

Multivariate Analysis: Multinomial Logistic Regression

Multinomial logistic regression analysis (NOMREG in SPSS) is used to examine the simultaneous association of SCT and HBM constructs with nutritional status (BMI percentile categories such as underweight, healthy weight, overweight/obese) and academic achievement (GPA categories such as high, medium, low) as polychotomous dependent variables. Multinomial logistic regression (MLR) is appropriate when the dependent variable has more than two unordered categories and the predictor variables are categorical or dichotomous (Omuemu & Ogboghodo, 2020). Both of which are applied in this study. In this way, multivariate analysis is performed to assess the association between food consumption patterns, nutritional status, and academic achievement among vegetarian and non-vegetarian school children (Denis, 2018).

Ethical Considerations

The Nepal Health Research Council (NHRC) has approved this study and provided ethical clearance letter (NHRC, Ref. No. 1926/2025). The student is asked for written consent before participating in the study, and participation is voluntary. Permission to conduct the study is obtained from the guardian/principal of selected schools. Before the study, verbal and written assent is obtained from the children and the written consent is obtained from parents or legal guardian of the children. Privacy and confidentiality of the survey is assured at all levels. Before data collection, the objectives of the study are shared to the respondents. The researcher respects the cultural value, norms and traditions of each respondent during the process of data collection. The researcher requests respondents to participate voluntarily in this study.

Here, the researchers fully commit to protect the respondents' right of privacy. No personal responses are disclosed; pseudo name or anonymity is used. It is ensured that the data of this research are used for academic purpose and not for other purpose.

Before beginning the study, the researcher ensures the willingness and consent of the students and their guardians, as well as the cooperation of school authorities and teachers.

Result and Discussion

The main purpose of the study is to identify the dietary intake, nutritional status, and academic achievement of vegetarian and non-vegetarian school children and their association. To the extent of our knowledge, this study might be novel to examine food intake, nutritional status, and academic achievement in this age group. Therefore, this study provides the first understanding of the overall connection between diet and nutrient intake and children's academic achievement. The data can subsequently be utilized to guide dietary patterns for research pertaining to academic achievement and nutritional health promotion. Therefore, this protocol contributes to minimizing research waste through the promotion of increased transparency and reporting in methodological studies; this makes it possible for their evaluation through following set reporting standards and through the provision of a database in which such studies can be accessed. It also assists end users in identifying gaps in methodology and reporting in a way that is likely to influence patient care; hence promoting the use of methodological evidence for enhancing research practice (Lawson et al., 2020). Thus, as we examine this repository of data on research methods, we intend to further highlight the importance of studies that aim to improve the design related with health, nutrition and education research. Most of the studies comparing the vegetarian diet to the non-vegetarian group, only included small samples of children under the age of five or adolescents. where blood measurements were used as indications of nutritional status in the majority of the trials (Dahal, 2019; Koirala, 2023). Furthermore, the literatures demonstrated that there is not enough current research to make informed judgments about the impacts of vegetarian diets on children across different nations (Schürmann et al., 2017). A study found that children's academic performance is influenced by their nutritional status, which is influenced by their dietary intake. Similarly, the study found that nutritional status of vegetarian and non-vegetarian females was nearly equal in the middle-class school-age population (13–15 years). There was a negligible difference between the two groups' academic and physical performance, with the non-vegetarian performing considerably faster than the vegetarian only in one physical exercise (touching toes) (Pareek & Ayesha, 2015).

In this scenario, a study claimed that compared to non-vegetarians, vegetarians has better nutrient intake. They have lower blood pressure, less harmful body fat, and less abdominal obesity. It is well known that people who eat primarily vegetarian food as children are less likely to develop chronic degenerative diseases (Koirala, 2023). Contradictorily, an observational quantitative cross-sectional study of Brazil in 134 students aged 9-11years concluded that there was no significant correlation found between dietary intake with nutritional status and academic achievement (Schmidt et al., 2018). In this controversy, there were few studies regarding the association between dietary intake and nutritional status as well as academic achievement of vegetarian and non-vegetarian children aged 6-14. So, these

findings will provide robust evidence that dietary intake may contribute to promoting nutrition status and academic success in children.

In addition, this protocol has developed the new theoretical framework that integrates Social Cognitive Theory with the Health Belief Model to explain how cognitive, behavioral, and social factors impact dietary intake and other outcomes. Self-efficacy, outcome expectations, observational learning, and self-regulation are important components of the reciprocal relationships among the individual characteristics, external stimuli, and behaviors that mold behavior (Bandura, 1986). People who are exposed to good social models and have higher levels of self-efficacy are more likely to acquire and maintain healthy eating habits. Meanwhile, HBM highlights how perceived benefits and barriers influence food choice and academic achievement of children, suggesting that people are more likely to adopt healthy behaviors when they believe the benefits outweigh the barriers (Rosenstock, 1974).

Strengths and Limitations

This study has several strengths because it focuses to minimize social desirable bias, various strategies are implemented, including the use of repeated dietary recall to reduce recall bias, random sampling to limit selection bias and confounding is addressed through multivariate analysis. Ethical approval for the study has been obtained from Nepal Health Research Council. Confidentiality and anonymity of participants is strictly maintained, and participation is voluntary with the right to withdraw at any time. Therefore, this study has the strength to report as methodological rigor, transparency and reproducibility. In addition, the combination of SCT and HBM has a number of research implications, including the suggestion that successful interventions should concentrate on boosting self-efficacy and self-regulation abilities by promoting social influence through parental support and peer modeling. Programs should also discuss the advantages and perceived obstacles of eating healthily.

Even though, we acknowledge that there are inherent challenges in searching and acquiring studies with contradictory findings. So, the main limitation of this study is that it uses only a cross-sectional design which precludes causal interference about the direction of relationship between study variables. It is not properly randomized and only took place in the Kathmandu district of Nepal. The 24hour dietary recall captures a single day's food intake which may not represent habitual dietary patterns This study does not offer a multi-level approach to changing environmental and societal factors.

Conclusion

Healthy dietary intake plays a crucial role to improve nutritional status and academic achievement of school children. The integration of behavioral theories such as Social Cognitive Theory and the Health Belief Model emphasizes the importance of self-efficacy, social support and reducing barriers to healthy eating. In this regard, this protocol provides the first comparative theory grounded quantitative evidence. The study establishes that the SCT and HBM provide a comprehensive theoretically valid and empirically productive framework for analyzing the determinants of nutritional status and academic outcomes in school children of Nepal. The expected outcome of this study becomes valuable in these two

groups; vegetarian and non-vegetarian. So the protocol provides critical insights for educators, policymakers, and healthcare professionals to support children's growth and development effectively.

Abbreviations

BAZ = BMI for Age Z score

BMI= Body Mass Index

HAZ =Height for Age Z Score

OE = Outcome Expectancy

SCT= Social Cognitive Theory

SE = Self-Efficacy

SR = Self- Regulation

WT = Weight

Acknowledgements

The authors would like to thank the Graduate School of Education, Tribhuvan University for supporting this study. Similarly, we would like to thank to reviewers of Nepal Health Research Council (NHRC) for their critical and constructive comments.

Author contributions

BKA designed the project and developed the manuscript. SG and YRU critically reviewed and edited the manuscript. All the authors read and approved the final manuscript for submission and publication.

Funding

This study did not receive any funding yet.

Data availability

Not applicable as this article does not present data.

Declarations

Ethical approval and consent to participate

The research protocol for the study is approved by the Graduate School of Education, Faculty of Education TU and Nepal Health Research Council (Ref. no. 1926/2025). Verbal as well as written inform consent and assent are obtained from their guardians and all children.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests

References

- Abraham, C., & Sheeran, P. (2005). The Health Belief Model. In M. Conner. & P. Norma (Eds.), *Predicting health behaviour: Research and practice with social cognition models* (Second ed., Vol. 2, pp. 30-55). Open University Press. <https://surl.li/nviwot>
- Acharya, D., Thapa, K. B., Bhandari, T. R., Giri, S., Upreti, Y. R., & Devkota, B. (2024). Benchmarking the determinants of nutritional status among community schools' children in Nepal. *Current Research in Nutrition and Food Science Journal*, 12(2), 747-765. <https://doi.org/10.12944/CRNFSJ.12.2.21>
- Adhikari, B. K., Giri, S., & Sharma, P. (2024). Evaluation of Childhood Dietary Patterns and Their Impact on Nutrition Status: A Literature Review. *International Journal of Nutrition and Food Sciences*, 13(3), 66-76. <https://doi.org/10.11648/j.ijnfs.20241303.12>
- Adhikari, B. K., Sharma, P., & Giri, S. (2025a). The Paradox of Health Literacy: Unchanged Nutritional Behaviors of Literates. *International Journal*, 14(2), 117-124. <https://doi.org/10.11648/j.ijnfs.20251402.14>
- Adhikari, B. K., Sharma, P., & Giri, S. (2025b). A Systematic Review on Dietary Pattern and Academic Performance of Children and Adolescents. *Shiksha Shastra Saurabh*, 25, 112-127. <https://doi.org/10.3126/sss.v25i1.90503>
- Adhikari, N., Adhikari, M., Shrestha, N., Pradhananga, P., Poudel, B., Dhungel, S., Joshi, P. C., Ide, N., Sharma, G. N., & Shrestha, A. (2023). Nutrition and food security in Nepal: a narrative review of policies. *Nutrition Reviews*, 81(12), 1612-1625. <https://doi.org/10.1093/nutrit/nuad025>
- Alharahsheh, H. H., & Pius, A. (2020). A Review of key paradigms: positivism VS interpretivism. *Glob Acad J Humanit Soc Sci*, 2(3), 39-43. <https://surl.li/jheysq>
- Asmare, B., Taddele, M., Berihun, S., & Wagnaw, F. (2018, Nov 9). Nutritional status and correlation with academic performance among primary school children, northwest Ethiopia. *BMC Res Notes*, 11(1), 805. <https://doi.org/10.1186/s13104-018-3909-1>
- Bandura, A. (1986). Social foundations of thought and action. *Englewood Cliffs, NJ*, 1986(23-28), 2. <https://bit.ly/423UFxc>
- Banstola, S., & Acharya, B. (2015). Nutritional Status of Primary School Children in Pumdhi Bhumdi Village of Kaski District, Nepal. *International Journal of Health Sciences & Research*, 5(5), 339-346. www.ijhsr.org
- Bede, F., Cumber, S. N., Nkfusai, C. N., Venyuy, M. A., Ijang, Y. P., Wepngong, E. N., & Kien, A. T. N. (2020). Dietary habits and nutritional status of medical school students: the case of three state universities in Cameroon. *Pan African Medical Journal*, 35(1). <https://doi.org/10.11604/pamj.2020.35.15.18818>

- Benton, D. (2010). The influence of dietary status on the cognitive performance of children. *Molecular nutrition & food research*, 54(4), 457-470. <https://doi.org/10.1002/mnfr.200900158>
- Bhandari, N., & Shrestha, G. (2012). Nutritional status and morbidity pattern in school age children in Nepal. *Journal of College of Medical Sciences-Nepal*, 8(2), 12-16. <https://bit.ly/4duQUqX>
- Burchi, F. (2012, July-Dec). Whose education Affects a Child's Nutritional status? From parents' to household's Education. *Demographic Research*, 27, 681-704. <https://doi.org/10.4054/DemRes.2012.27.23>
- Clarke, T. (2020). Children's wellbeing and their academic achievement: The dangerous discourse of 'trade-offs' in education. *Theory and Research in Education*, 18(3), 263-294. <https://doi.org/10.1177/1477878520980197>
- Clarys, P., Deliens, T., Huybrechts, I., Deriemaeker, P., Vanaelst, B., De Keyzer, W., Hebbelinck, M., & Mullie, P. (2014). Comparison of nutritional quality of the vegan, vegetarian, semi-vegetarian, pesco-vegetarian and omnivorous diet. *Nutrients*, 6(3), 1318-1332. <https://doi.org/10.3390/nu6031318>
- Conner, M., & Norman, P. (Eds.). (2005). *Predicting health behaviour: a social cognition approach* (Vol. 2). Open University Press.
- Creswell, J. W. (2013). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. SAGE Publications. <https://books.google.com.np/books?id=PViMtOnJ1LcC>
- Dahal, J. (2019). *Nutritional status and food consumption of working population of Dharan, Nepal* [Doctoral dissertation, Tribhuvan University]. <https://surl.lt/tgworh>
- Denis, D. J. (2018). *SPSS data analysis for univariate, bivariate, and multivariate statistics*. John Wiley & Sons. <https://doi.org/https://doi.org/10.1002/9781119465775>
- Faught, E. L., Ekwaru, J. P., Gleddie, D., Storey, K. E., Asbridge, M., & Veugelers, P. J. (2017). The combined impact of diet, physical activity, sleep and screen time on academic achievement: a prospective study of elementary school students in Nova Scotia, Canada. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 29.
- Fynn-Sackey, U. A., & Abdul Salam, M. (2015). *Effects of malnutrition among children in Sub-Saharan Africa and Southern Asia* [Bachelor's Thesis, Laurea University of Applied Sciences]. <https://surl.li/vrpren>
- Gaines, A., & Turner, L. W. (2009). Improving Fruit and Vegetable Intake Among Children: Application of the Social Cognitive Theory. *California Journal of Health Promotion*, 7(1), 52-66. <https://surl.li/mhvwij>
- Gajre, N. S., Fernandez, S., Balakrishna, N., & Vazir, S. (2008). Breakfast eating habit and its influence on attention-concentration, immediate memory and school achievement. *Indian pediatrics*, 45(10), 824. <https://surl.lu/jdgzee>

- Gan, W. Y., Boo, S., Seik, M. Y., & Khoo, H. E. (2018). Comparing the nutritional status of vegetarians and non-vegetarians from a Buddhist Organisation in Kuala Lumpur, Malaysia. *Malaysian Journal of Nutrition*, 24(1). <https://surl.lu/lmnao>
- Gibson, R. S. (2005). *Principles of nutritional assessment*. Oxford university press. <https://bit.ly/4cJJ5NN>
- Gray, H. L., Sinha, S., Buro, A. W., Robinson, C., Berkman, K., Agazzi, H., & Shaffer-Hudkins, E. (2018). Early history, mealtime environment, and parental views on mealtime and eating behaviors among children with ASD in Florida. *Nutrients*, 10(12), 1867. <https://doi.org/10.3390/nu10121867>
- Gyawali, B., Khanal, P., Mishra, S. R., van Teijlingen, E., & Wolf Meyrowitsch, D. (2020). Building strong primary health care to tackle the growing burden of non-communicable diseases in Nepal. *Global Health Action*, 13(1), 1788262. <https://doi.org/10.1080/16549716.2020.1788262>
- Haines, J., Haycraft, E., Lytle, L., Nicklaus, S., Kok, F. J., Merdji, M., Fisberg, M., Moreno, L. A., Goulet, O., & Hughes, S. O. (2019, 2019/06/01/). Nurturing Children's Healthy Eating: Position statement. *Appetite*, 137, 124-133. <https://doi.org/https://doi.org/10.1016/j.appet.2019.02.007>
- Hamulka, J., Gutkowska, K., & Czarniecka-Skubina, E. (2024). Attitudes of 10–12-year-old primary school pupils towards food and nutrition: insights from Qualitative FGI Research-Junior-Edu-Żywnienie (JEŻ) Project. *Annals of Agricultural and Environmental Medicine*, 31(2). <https://doi.org/10.26444/aaem/176350>
- Jain, S., Dehalwar, K., & Sharma, S. N. (2024). Explanation of Delphi research method and expert opinion surveys. *Think India*, 27(4), 37-48. <https://shorturl.at/dt0p3>
- Kesmodel, U. S. (2018). Cross-sectional studies—what are they good for? *Acta obstetrica et gynecologica Scandinavica*, 97(4), 388-393. <https://doi.org/10.1111/aogs.13331>
- Kiely, K., Mase, W. A., Hansen, A. R., & Schwind, J. (2022). Association between the health belief model, exercise, and nutrition behaviors during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19(23), 15516. <https://doi.org/10.3390/ijerph192315516>
- Koirala, B. R. (2023). *Comparative study on nutritional status of vegetarian and non-vegetarian adolescents of pranaminagar, bhadrapur* [Doctoral dissertation, Tribhuvan University]. <https://surl.lu/guiems>
- Koirala, S. (2019). *Comparative study on nutritional status of primary level school children studying in private and public schools of Babiya VDC, Sunsari* Tribhuvan University]. <https://bit.ly/3P9hsog>
- Kothari, C. R. (2011). *Research methodology. Methods and Techniques*. New Age International (P) Ltd. <https://surl.lu/pabsgj>
- Lawson, D. O., Puljak, L., Pieper, D., Schandelmaier, S., Collins, G. S., Brignardello-Petersen, R., Moher, D., Tugwell, P., Welch, V. A., & Samaan, Z. (2020). Reporting

- of methodological studies in health research: a protocol for the development of the Methodological Study reportIng Checklist (MISTIC). *BMJ open*, 10(12), e040478. <https://doi.org/10.1136/bmjopen-2020-040478>
- Majka, M. (2024). the Delphi methodology. *Novomatic technology Poland P*. <https://shorturl.at/qUlgO>
- McHugh, M. L. (2013). The chi-square test of independence. *Biochemia medica*, 23(2), 143-149. <https://doi.org/10.11613/BM.2013.018>
- Melina, V., Craig, W., & Levin, S. (2016). Position of the academy of nutrition and dietetics: vegetarian diets. *Journal of the Academy of Nutrition and Dietetics*, 116(12), 1970-1980. <https://doi.org/https://doi.org/10.1016/j.jand.2016.09.025>
- Nikalansooriya, A., Waidyaratna, G. N. N., Kaththiriarachchi, L. S., Chandrasekara, A., & Kaththiriarachchi, L. (2025). Role of Nutrition in Cognitive Development and Academic Performance During Adolescence: A Comprehensive Review. *Cureus*, 17(11). <https://doi.org/10.7759/cureus.96189>
- Omuemu, V. O., & Ogboghodo, E. O. (2020). Nutritional Factors and Academic Performance of Primary School Children in an Urban City in Southern Nigeria. *Journal of Health and Medical Sciences*, 3(3), 310-321. <https://doi.org/10.31014/aior.1994.03.03.126>
- Pareek, P., & Ayesha, S. (2015). Physical and academic performance of vegetarian and non-vegetarian school girls (13–15 yrs). *Advanced Studies in Biology*, 7(2), 79-88. <https://doi.org/10.12988/asb.2015.41165>
- Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health education monographs*, 2(4), 328-335. <https://bit.ly/4ukphGH>
- Saavedra, J. M., & Prentice, A. M. (2023). Nutrition in school-age children: a rationale for revisiting priorities. *Nutrition Reviews*, 81(7), 823-843. <https://doi.org/10.1093/nutrit/nuac089>
- Schmidt, A. L., Strack, M. H., & Conde, S. R. (2018). Relationship between food consumption, nutritional status and school performance. *Journal of Human Growth and Development*, 28(3), 240-251. <https://doi.org/10.7322/jhgd.152159>
- Schürmann, S., Kersting, M., & Alexy, U. (2017). Vegetarian diets in children: a systematic review. *European journal of nutrition*, 56(5), 1797-1817. <https://doi.org/10.1007/s00394-017-1416-0>
- Sharma, M. K., & Adhikari, R. (2022). Effect of School Water, Sanitation, and Hygiene on Health Status Among Basic Level Students' in Nepal. *Environmental Health Insights*, 16, 1-7. <https://doi.org/11786302221095030>
- Sheema, M. K., Rahman, R., Yasmin, Z., Rahman, M., Choudhary, M., Ali, M., & Javed, A. (2016). Food habit and nutritional status of rural women in Bangladesh. *American Journal of Rural Development*, 4(5), 114-119. <https://doi.org/DOI:10.12691/ajrd-4-5-3>

- Simeone, G., Bergamini, M., Verga, M. C., Cuomo, B., D'Antonio, G., Iacono, I. D., Mauro, D. D., Mauro, F. D., Mauro, G. D., & Leonardi, L. (2022). Do vegetarian diets provide adequate nutrient intake during complementary feeding? A systematic review. *Nutrients, 14*(17), 3591. <https://doi.org/10.3390/nu14173591>
- Subedi, D. (2016). Explanatory sequential mixed method design as the third research community of knowledge claim. *American Journal of Educational Research, 4*(7), 570-577. <https://doi.org/10.12691/education-4-7-10>
- Tia, A., Konan, A. G., Hauser, J., Ndri, K. Y., Ciclet, O., Ezzo, L. E., & Nindjin, C. (2025). A Cross-Sectional Study of the Relationship Between Dietary Micronutrient Intake, Cognition and Academic Performance Among School-Aged Children in Taabo, Côte d'Ivoire. <https://doi.org/10.20944/preprints202508.1374.v1>
- Tjon-A-Ten, Z. (2025). *Perceived Tourism Impact in the Kathmandu Valley: A study on the perspectives of local residents across three generations* (Publication No. 2539861) [Master Thesis, Universiteit Utrecht]Global.
- WHO. (2007). *Growth reference data for 5-19 years*. World Health Organization. <https://surl.li/vdcjch>