

## **Nutrition Education in Primary Schools: A Longitudinal Study**

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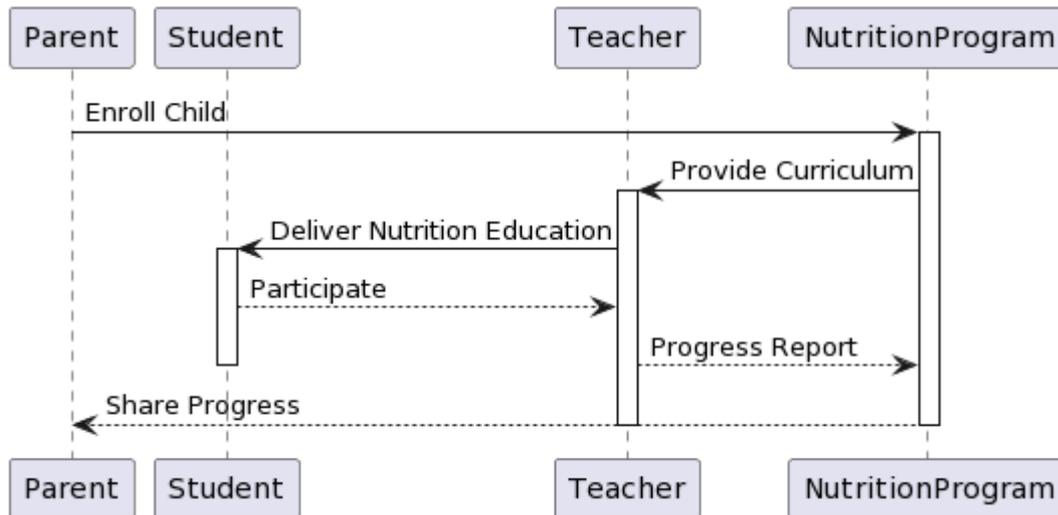
**Abstract:** Over the years, numerous studies have explored the impact of nutrition education on children's behaviour and attitudes, consistently demonstrating its positive influence on nutritional habits, physical well-being, and academic performance. This study aims to investigate the effects of a nutrition education program on students' attitudes and behaviors concerning nutrition, sports, and academic achievement. Employing an experimental research design with pretest-post-test control groups, the study engaged 60 students from Kazakhstan. Data collection involved the utilization of scales assessing nutritional behaviour, attitudes towards nutrition, sports performance, attitudes towards sports, along with a general academic achievement test. Results reveal that students exposed to the nutrition education program exhibited enhanced nutrition attitudes and behaviors, coupled with elevated sports performance and attitudes compared to their counterparts in the control group. Nevertheless, no notable disparity emerged in overall academic achievement between the experimental and control groups. These findings underscore the pivotal role of nutrition education interventions in cultivating healthier lifestyles among schoolchildren, with potential implications for comprehensive educational strategies aimed at fostering holistic well-being and academic success. The study highlights the importance of integrating nutrition education into school curriculum to promote healthier lifestyles and enhance overall academic achievement.

**Keywords:** Health Nutrition Education, Sports Nutrition, Home Food Availability, School Health Policies, Demographic Predictors.

### **I. Introduction**

Nutrition education is a critical component of promoting healthy lifestyles and preventing diet-related diseases, particularly among children and adolescents. With the global rise in childhood obesity and the prevalence of unhealthy dietary habits, there is growing

recognition of the importance of implementing effective nutrition education programs in primary schools. These programs aim to equip students with the knowledge, skills, and attitudes necessary to make informed food choices, adopt healthy eating habits, and maintain optimal health throughout their lives [1].



**Figure 1. Depicts the Interaction of Participants for Nutrition Education in Primary Schools**

Numerous studies have investigated the impact of nutrition education on children's behaviour and attitudes towards food. Research findings consistently highlight the positive effects of nutrition education interventions on students' nutritional knowledge, dietary behaviors, and physical health outcomes. However, there remains a need for longitudinal studies to comprehensively assess the long-term effectiveness and sustainability of these programs, particularly in diverse socio-economic contexts[2].we aim to address this gap by conducting a longitudinal investigation into the impact of a nutrition education program on primary school students' nutritional attitudes and behaviors, sports attitudes and performance, and academic achievement. By employing an experimental research design with pretest-post-test control groups, we seek to assess the effectiveness of the nutrition education intervention over an extended period, spanning multiple school years[3].

**A. Background**

Childhood obesity and poor dietary habits are significant public health concerns worldwide. According to the World Health Organization (WHO), the global prevalence of obesity among children and adolescents has increased dramatically in recent decades, with approximately 38 million children under the age of 5 being overweight or obese in 2020. Unhealthy eating habits, characterized by excessive consumption of processed foods high in sugar, fat, and salt, are major contributors to the obesity epidemic and the development of chronic diseases such

as type 2 diabetes, cardiovascular disease, and certain cancers[4]. Primary schools are ideal settings for implementing nutrition education programs, as they provide access to a large and diverse population of children during a critical period of development. Nutrition education interventions in schools typically aim to improve students' knowledge of nutrition, promote healthy eating behaviors, and create supportive environments that facilitate healthy choices. These interventions may involve classroom-based education, hands-on activities, school meal programs, and collaboration with parents, teachers, and community stakeholders[5].

Previous research has demonstrated the effectiveness of nutrition education programs in improving students' dietary behaviors and nutritional knowledge. For example, a systematic review and meta-analysis published in the Journal of School Health found that school-based nutrition education interventions led to significant improvements in dietary habits, including increased consumption of fruits and vegetables and reduced intake of sugary beverages and unhealthy snacks[6]. Similarly, a study conducted in elementary schools in the United States found that students who participated in a nutrition education program showed improvements in their nutritional knowledge and food choices compared to control groups.

### **B. Rationale for the Study**

While existing research provides valuable insights into the short-term effects of nutrition education programs, there is limited evidence on their long-term impact, particularly in diverse cultural and socio-economic contexts. Longitudinal studies are needed to assess the sustained effects of nutrition education interventions on children's dietary behaviors, health outcomes, and academic achievement over time. Kazakhstan provides an interesting context for studying the effectiveness of nutrition education programs, as the country faces unique challenges related to nutrition and health [7]. Rapid urbanization, changing dietary patterns, and economic transitions have led to shifts in food consumption patterns, with increased reliance on processed foods and sugary beverages. Additionally, disparities in access to nutritious foods and health education exist among different socio-economic groups, highlighting the importance of targeted interventions to address these inequalities. By conducting a longitudinal study in Kazakhstan, we aim to contribute to the existing literature on nutrition education and its impact on children's health and academic outcomes. Our research will provide valuable insights into the effectiveness of nutrition education programs in diverse cultural and socio-economic contexts, helping to inform policy and practice in promoting healthy lifestyles among children and adolescents globally [8].

**C. Research Objectives:**

The primary objective of this study is to determine the long-term effects of a nutrition education program on primary school students' nutritional attitudes and behaviors, sports attitudes and performance, and academic achievement. Specifically, we seek to:

1. Assess changes in students' nutritional attitudes and behaviors following participation in the nutrition education program.
2. Evaluate the impact of the nutrition education program on students' attitudes towards sports and physical activity.
3. Measure changes in students' sports performance and physical fitness levels over time.
4. Examine the relationship between students' nutritional attitudes and behaviors, sports attitudes and performance, and academic achievement.
- 5.

**II. Literature Review**

Nutrition education has emerged as a pivotal component in enhancing both the health status and academic performance of school-aged children[9]. Studies underscore the significance of health education within educational settings, revealing its positive correlation with improved health conditions and academic achievements among students. Delving into the efficacy of nutrition education interventions, particularly among college athletes, research has found notable improvements in dietary behaviors among participants[10]. This underscores the potential of targeted educational initiatives in fostering healthier lifestyles among specific demographics. Similarly, examinations into the impact of sports nutrition education on athletes showcase positive outcomes ranging from enhanced nutritional knowledge to improved performance metrics. Complementing targeted interventions are broader initiatives aimed at fostering healthier eating habits within school environments[11]. Studies shed light on the role of home food availability in shaping children's dietary choices, highlighting environmental influences on food consumption patterns[12]. Exploration into the impact of school health policies and physical education programs on student nutrition and physical activity levels advocates for holistic approaches to health promotion within educational settings.

| Auth or & Year | Area                   | Methodology         | Key Findings  | Challenges                             | Pros  | Cons  | Application                                  |
|----------------|------------------------|---------------------|---|--|---|---|--|
| Abood et al.   | Nutrition Education    | Intervention Study  | Nutrition education interventions improve dietary behaviors among college female athletes.  | Implementation logistics               | Improves nutritional knowledge and behaviors among athletes | Requires resources and time for implementation    | Sports Nutrition Programs, Athletic Training |
| Cholewa et al. | Sports Nutrition       | Intervention Study  | Sports nutrition education enhances nutritional knowledge, body composition, and performance in NCAA Division I baseball players. | Participant recruitment and compliance | Enhances athletic performance                               | Requires specialized expertise for implementation | Sports Teams, Athletic Departments           |
| Cooke et al.   | Home Food Availability | Observational Study | Home food availability  | Limited generalizability to            | Identifies environmental                                    | Does not account for                              | Public Health Campaign                       |

|            |                        |                       |  |                                |  |   |  |
|------------|------------------------|-----------------------|--|--------------------------------|--|---|--|
|            | ity                    |                       | y<br>influence<br>s<br>children's<br>dietary<br>choices,<br>highlighti<br>ng the<br>importanc<br>e of<br>environm<br>ental<br>factors.         | diverse<br>population<br>s     | factors<br>influencin<br>g dietary<br>habits       | individual<br>preference<br>s and<br>behaviors      | ns,<br>Family-<br>based<br>Intervent<br>ions |
| Lee et al. | School Health Policies | Cross-sectional Study | School health policies and physical education programs impact student nutrition and physical activity levels, emphasizing holistic approaches. | Policy implementation barriers | Supports comprehensive health promotion approaches | Requires policy advocacy and stakeholder engagement | School Health Programs, Policy Advocacy      |
| Conte      | Nutrition              | Review                | Evidence-  | Research                       | Provides   | Limited   | Nutrition                                    |

|               |                            |        |   |                                 |   |   |   |
|---------------|----------------------------|--------|---|---------------------------------|---|---|---|
| nto           | Educatio<br>n              |        | based<br>nutrition<br>education<br>programs<br>are<br>effective<br>in<br>shaping<br>dietary<br>behaviors<br>and<br>improvin<br>g health<br>outcomes<br>among<br>various<br>populatio<br>ns. | translation<br>into<br>practice | practical<br>guidelines<br>for<br>nutrition<br>education                    | applicabili<br>ty to<br>diverse<br>cultural<br>contexts   | Educatio<br>n<br>Program<br>s, Health<br>Promoti<br>on<br>Campaig<br>ns           |
| Egg et<br>al. | Nutrition<br>Knowled<br>ge | Survey | Nutrition<br>knowledg<br>e and<br>education<br>significan<br>tly<br>influence<br>dietary<br>behaviors<br>and<br>lifestyle<br>habits<br>among<br>adolesc<br>ts.                              | Self-report<br>biases           | Identifies<br>education<br>al<br>interventi<br>ons as<br>effective<br>tools | Limited<br>generaliza<br>bility to<br>other age<br>groups | School-<br>based<br>Nutrition<br>Educatio<br>n, Youth<br>Outreach<br>Program<br>s |

|                      |                                   |                            |  |   |  |   |   |
|----------------------|-----------------------------------|----------------------------|--|---|--|---|---|
| Gross<br>o et<br>al. | Socio-<br>economy<br>c Factors    | Survey                     | Socio-<br>economic<br>factors<br>play a<br>significan<br>t role in<br>shaping<br>dietary<br>behaviors<br>and<br>nutritio<br>nal status<br>among<br>children<br>and<br>adolescen<br>ts. | Socio-<br>economic<br>disparities                         | Highlights<br>disparities<br>and<br>inequities<br>in dietary<br>habits           | May<br>overlook<br>individual-<br>level<br>influences<br>and<br>preference<br>s | Commu<br>nity-<br>based<br>Nutrition<br>Program<br>s, Policy<br>Advocac<br>y                  |
| Cook<br>e et<br>al.  | Demogra<br>phic<br>Predictor<br>s | Observati<br>onal<br>Study | Demogra<br>phic<br>predictors<br>influence<br>fruit and<br>vegetable<br>consumpt<br>ion<br>among<br>preschool<br>children,<br>indicating<br>socio-<br>economic<br>disparitie<br>s.     | Limited<br>generaliza<br>bility to<br>other age<br>groups | Identifies<br>socio-<br>economic<br>factors<br>influencin<br>g dietary<br>habits | Focuses<br>primarily<br>on one<br>demograp<br>hic group                         | Early<br>Childho<br>od<br>Nutrition<br>Program<br>s,<br>Family-<br>based<br>Intervent<br>ions |

**Table 1. Summarizes the Literature Review of Various Authors****III. Method and Materials:**

The approach employed in this study involved implementing a nutrition education program aimed at assessing its impact on students' attitudes and behaviors related to nutrition, sports, and academic achievement. The study utilized an experimental research design with pretest-post-test control groups to compare outcomes between participants who received the nutrition education intervention and those who did not. Data collection involved administering various scales to measure nutritional behaviour, attitudes towards nutrition, sports performance, attitudes towards sports, and a general academic achievement test. Statistical analysis was conducted to examine differences between the experimental and control groups and evaluate the effectiveness of the nutrition education program.

**A. Materials**

To give a thorough picture of the program's effects, participants in a long-term study on "Nutrition Education in Primary Schools" should be carefully chosen. A broad sample of primary school pupils representing a range of grades, ages, genders, socioeconomic backgrounds, and academic achievements is the main focus of this study. In order to evaluate the impact of nutrition education at home, it is imperative to collect data on parents' or guardians' educational background, work status, and eating habits. Teachers are essential, especially those who are in charge of nutrition instruction, therefore information about their background in education, their training, and how successful they believe their programs are is essential. School administrators offer perceptions into the general atmosphere of the school, encouragement of nutrition instruction, and any implementation difficulties. A valid comparison of schools with and without the nutrition education program can be made by creating a comparison or control group and randomly assigning certain schools to not receive the specified intervention. People in the community, such as leaders, dietitians, or medical professionals, provide a more comprehensive viewpoint on challenges or resources in the area. Diversity in ethnic and cultural groupings guarantees representation that takes into consideration differences in customs and eating habits. The study's longitudinal component is following the same participants over a number of years to see how their knowledge, attitudes, and behaviors have changed. To guarantee the study's validity and community relevance, informed consent from participants or their legal guardians is essential. It emphasizes the voluntary nature of participation and upholds ethical norms.

| Participant Group          | Characteristics/Information Collected  |
|----------------------------|--|
| Primary School Students    | - Randomly selected from different grades  |
|                            | - Diverse in terms of age, gender, socioeconomic background, academic performance            |
| Parents or Guardians       | - Parents of selected students   |
|                            | - Information on educational background, employment, and dietary habits                      |
| Teachers                   | - Responsible for delivering nutrition education   |
|                            | - Teaching experience, training in nutrition education, perceptions of program effectiveness |
| School Administrators      | - Overall school environment, support for nutrition education, challenges faced              |
| Comparison/Control Group   | - Randomly assigned schools not receiving specific nutrition education                       |
| Community Members          | - Local healthcare professionals, nutritionists, community leaders                           |
| Health Professionals       | - Collaboration for expertise, guidance, and potential health-related data                   |
| Ethnic and Cultural Groups | - Representation from different ethnic and cultural backgrounds                              |
| Longitudinal Participants  | - Tracking the same individuals over several years   |

**Table 2. Summarizes the Description of Participants**

**B. Analysis Method & Tools**

To procure sufficient data for a longitudinal investigation on "Nutrition Education in Primary Schools," a multipronged strategy incorporating several data gathering instruments is required. To evaluate the students' nutritional knowledge, attitudes, and actions, surveys and questionnaires are essential tools in this endeavour. Age-appropriate questions, both closed-ended for quantitative analysis and open-ended for qualitative insights, might be included in the design of these instruments. Pre- and post-tests are essential because they allow for the tracking of changes in the variables that are being measured over time. Observational approaches provide important real-time insights into the practical implications of nutrition education. Examples of these methods include direct observations of students' eating patterns

during school hours and the monitoring of classroom activities. Focus group talks offer a forum for in-depth investigation, gathering various viewpoints from parents, instructors, and students regarding their experiences, opinions, and difficulties with nutrition education.

| <b>Data Collection Tool</b> | <b>Purpose/Variable Measured</b>   | <b>Additional Information/Considerations</b>  |
|-----------------------------|--|---|
| Surveys/Questionnaires      | Knowledge, attitudes, and behaviors related to nutrition                 | Design age-appropriate questions; include closed-ended and open-ended items             |
| Pre and Post-Tests          | Assess changes in knowledge, attitudes, and behaviors over time          | Administered at the beginning (baseline) and periodically throughout the study          |
| Observational Methods       | Evaluate eating habits during school hours; observe classroom activities | Use checklists for systematic observation; ensure minimal disruption to normal routines |
| Focus Group Discussions     | In-depth insights into perceptions, experiences, and challenges          | Form diverse groups (students, teachers, parents); use a skilled facilitator            |
| Interviews                  | Deeper understanding of implementation process and challenges            | Conduct individual interviews with key stakeholders; allow for open-ended responses     |
| Dietary Logs or Journals    | Track changes in eating habits   | Provide guidance on recording food intake; consider periodic review with participants   |
| Anthropometric Measurements | Assess physical impact on height, weight, etc.                           | Ensure trained personnel for accurate measurements; respect privacy and sensitivity     |
| School Records              | Attendance rates, academic performance, participation in activities      | Analyze records for trends or correlations with nutrition education                     |
| Technology-Based Tools      | Online quizzes, educational games, virtual resources                     | Ensure access for all students; consider digital literacy levels                        |

|                     |  |   |
|---------------------|--|---|
| Parental Surveys    | Parental involvement, perceptions, changes in family practices | Design clear questions; consider language barriers and cultural nuances                                     |
| Biochemical Markers | Nutrient levels, biomarkers of dietary patterns                | Requires ethical considerations, informed consent, and possibly collaboration with healthcare professionals |

**Table 3. Summarizes the Various Data Gathering Tools for Assessment**

Key stakeholders, including educators, school administrators, and nutrition education specialists, were interviewed to provide a qualitative perspective and provide insight into the implementation process and any obstacles that may have arisen. Students' first-hand reports of their eating habits can be gathered through dietary logs or journals, which offer a thorough record that documents any changes in their eating habits. Anthropometric measurements provide a quantitative evaluation of the physical effects of nutrition education on students' health. These measurements include height, weight, and other pertinent indicators. Additional quantitative data sources that indirectly represent the possible impact of nutrition education are school records, which include attendance rates, academic achievement, and involvement in extracurricular activities. By utilizing technology-based resources, such interactive tests, online portals, and educational games, primary school pupils in the digital age are catered to, and the process of learning is expedited. Parental surveys play a crucial part in comprehending the function of family dynamics by providing valuable information regarding parental involvement, perceptions, and any changes in family practices that may have been noticed. By providing objective data on nutrient levels and dietary patterns, biochemical markers—which are obtained from biological samples like blood or urine—can be included in more advanced research to offer a deeper knowledge of the physiological impact of nutrition education. A thorough and comprehensive investigation of the efficacy and long-term effects of nutrition education programs in primary schools is ensured by the thoughtful integration of these various data collection technologies.

**C. Attitude towards Nutrition Scale:**

The Attitude towards Nutrition Scale is a tool utilized to measure individuals' attitudes, beliefs, and perceptions regarding nutrition and healthy eating habits. This scale typically comprises a series of statements or questions aimed at assessing various aspects of an individual's attitudes towards nutrition, such as their beliefs about the importance of healthy

eating, their level of motivation to make healthy food choices, and their confidence in their ability to maintain a nutritious diet. Respondents may be asked to rate their agreement or disagreement with each statement on a Likert scale, ranging from strongly agree to strongly disagree. Alternatively, they may be asked to indicate the extent to which they agree or disagree with each statement on a numerical scale. The Attitude towards Nutrition Scale serves as a valuable tool for researchers, healthcare professionals, and educators interested in understanding individuals' perceptions of nutrition and identifying potential barriers or facilitators to adopting healthy eating habits. By assessing attitudes towards nutrition, the scale can help inform the development of effective nutrition education programs, interventions, and public health campaigns aimed at promoting healthier dietary behaviors.

When utilizing the Attitude towards Nutrition Scale, it is essential to ensure that the statements or questions included in the scale are valid, reliable, and culturally sensitive to the target population. Additionally, researchers may consider conducting validation studies to assess the psychometric properties of the scale and establish its validity and reliability for use in specific contexts or populations.

#### **IV. Conclusion**

Choosing the right data collection instruments is essential to carrying out an in-depth and perceptive longitudinal research on "Nutrition Education in Primary Schools." Researchers can compile a thorough dataset by using a variety of instruments, including surveys, pre- and post-tests, observational methods, focus groups, interviews, dietary logs, anthropometric measures, school records, technology-based tools, and parental surveys. These resources address a number of topics, such as the practical effects of nutrition education in educational contexts as well as students' nutrition-related knowledge, attitudes, and behaviors. The use of technological tools guarantees flexibility in response to the dynamic educational environment, and parental surveys offer significant perspectives into the wider family environment impacting kids' eating behaviors. The study benefits from objective data provided by anthropometric measures and biochemical markers, which provide measurable indicators of the physical impact of nutrition instruction. The objective of the longitudinal study is to offer a comprehensive comprehension of the efficacy and durability of nutrition education programs in primary schools by using this diverse methodology. The integration of qualitative and quantitative data obtained from these instruments will not only provide insight into the short-term effects but also reveal long-term trends and patterns. This will empower educators, policymakers, and other stakeholders to make well-informed decisions regarding the improvement of nutrition education initiatives in elementary schools.

## V. Future Scope

The General Academic Achievement Test is a standardized assessment tool designed to measure students' overall academic performance across various subjects or domains. This test typically covers fundamental academic areas such as mathematics, language arts, science, and social studies, and may also include additional components depending on the educational curriculum and standards. The General Academic Achievement Test aims to provide educators, policymakers, and researchers with valuable insights into students' academic strengths and weaknesses, as well as their proficiency levels in different subjects. By assessing students' knowledge, skills, and understanding of key concepts, the test helps inform instructional strategies, curriculum development, and educational interventions to support student learning and achievement. The content and format of the General Academic Achievement Test may vary depending on the educational system and testing standards in place. It may be administered in paper-based or computerized formats and may include multiple-choice questions, short-answer responses, essays, or performance tasks to assess students' comprehension, critical thinking, and problem-solving abilities. Educators and educational institutions often use the results of the General Academic Achievement Test to identify areas for improvement, track student progress over time, and make data-driven decisions to enhance teaching and learning practices. Additionally, policymakers may use aggregate test scores to evaluate the effectiveness of educational policies and initiatives at the school, district, or national level. When administering the General Academic Achievement Test, it is essential to ensure that the test items are aligned with established educational standards and are appropriate for the grade level and abilities of the students being assessed. Additionally, test administrators should adhere to standardized procedures for test administration, scoring, and reporting to maintain reliability and validity.

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