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# Impact of Nutrition Education on Adolescent Food Choices, Knowledge, and Lifestyle

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**ABSTRACT**

**Background:** Adolescence is a pivotal developmental stage during which enduring dietary behaviours and lifestyle patterns are established, profoundly influencing long-term health outcomes. Increasing reliance on ultra-processed foods, high sugar intake, and irregular eating patterns among adolescents has been linked to the rising prevalence of obesity, metabolic disorders, and psychosocial challenges. School-based nutrition education is widely recognized as a cost-effective strategy for fostering health literacy and preventive behaviours during this formative period.

**Methods:** A quasi-experimental pre- and post-intervention study was conducted among 97 adolescents aged 13–16 years from a single educational institution. Participants completed structured questionnaires assessing nutritional knowledge, dietary practices, attitudes toward healthy eating, and lifestyle awareness before and after a multi-session nutrition workshop. The intervention incorporated interactive teaching methods addressing balanced diets, nutrient functions, hydration, processed food consumption, meal patterns, label reading, and the interrelationship between nutrition, physical health, and mental well-being.

**Results:** Pre-intervention findings revealed moderate nutritional awareness alongside regular consumption of staple foods and notable intake of sugar-rich and processed items. Post-intervention assessments demonstrated substantial improvements in understanding of balanced meal composition, micronutrient sources, and the physiological importance of hydration. Participants exhibited increased awareness of the adverse effects of meal skipping and excessive sugar consumption on mood, energy, and cognitive functioning. Approximately 64.9% reported intention to adopt healthier dietary or lifestyle behaviours, accompanied by enhanced engagement with family members regarding food choices.

**Conclusion:** The study demonstrates that structured, interactive nutrition education can significantly enhance adolescents' nutritional literacy, attitudes, and readiness for behaviour change. Integration of such programs within school curricula may contribute to long-term prevention of non-communicable diseases and support holistic adolescent well-being.

**Keywords:** nutrition education, adolescents, dietary behaviour, school intervention, lifestyle

## Chapter 1
## Introduction

Adolescence is a critical window for developing long-term dietary habits that significantly influence health throughout the lifespan. This report outlines a research design to evaluate the effectiveness of a school-based nutrition workshop for adolescents using a pre- and post-intervention questionnaire. The study will measure the workshop's impact on students' nutritional knowledge and attitudes, tracking changes in

dietary awareness and food choices. The methodology is grounded in behavioral and educational theories and leverages information science for rigorous data collection and analysis. The report details the research framework, intervention design, data analysis plan, and discusses the potential implications for public health, as well as limitations and future research avenues.

The dietary patterns established during the school years have a profound, long- term impact on health. During adolescence, individuals experience significant physical growth and psychosocial development, coupled with an increasing desire for autonomy in food choices. This often leads to poor eating habits, such as a high intake of processed foods and sugary drinks, and frequent meal skipping. These behaviors, influenced by peers, media, and a search for independence, contribute to the rising prevalence of obesity and other non- communicable diseases, both in the short and long term.

School-based nutrition education is a powerful intervention tool to counteract these negative trends. By providing students with knowledge and skills in a structured setting, such programs can promote healthier eating patterns and prevent the onset of chronic disease. This study aims to contribute to the body of evidence supporting such interventions by methodically evaluating a nutrition workshop using a robust pre- and post-intervention design.

The research is guided by a socio-ecological model, acknowledging that individual behaviors are shaped by multiple layers of influence, including personal factors, social networks (peers, family), and environmental factors (school food environment, media).

Adolescence is characterized by significant neurodevelopmental changes, particularly in the prefrontal cortex (PFC), which governs executive function, and the Mes corticolimbic dopamine pathway, which regulates reward processing. The heightened reward sensitivity and still-developing inhibitory control make adolescents particularly susceptible to rewarding, palatable foods, such as those high in fat and sugar. Habits formed during this critical period can therefore significantly influence lifelong dietary trajectories. Longitudinal studies, such as Project EAT, demonstrate the tracking of dietary patterns from adolescence into adulthood.

Poor adolescent nutrition has a direct and measurable impact on both physical and cognitive health.

- Physical Health: Excessive consumption of processed foods and sugar- sweetened beverages (SSBs) is a major driver of obesity, type 2 diabetes, and other cardiometabolic diseases. Processed foods, which are high in unhealthy fats, sugar, and salt, lack essential nutrients and promote excessive caloric intake. Meal skipping, especially breakfast, is linked to higher fast-food consumption and poorer nutritional quality.
- Cognitive Health: Diets high in fat and sugar can negatively impact brain function. Research has shown that these diets can impair the functioning of the hippocampus (critical for memory and learning) and the prefrontal cortex, leading to cognitive impairments, impulsivity, and altered reward processing. Conversely, healthy eating is associated with improved alertness, memory, and information processing.

Systematic reviews and intervention studies have demonstrated that nutrition education can positively influence adolescents' dietary behaviors, particularly when programs are well-designed and theory driven. Effective programs often use behavioral and social learning theories to build not just knowledge, but also skills, self-efficacy, and positive attitudes towards healthy eating. This education needs to extend beyond simply providing information to addressing the complex personal and environmental factors that shape food choices.

## CHAPTER 2
## REVIEW OF LITERATURE

**Health-Promoting Schools (HPS) Cochrane Review (Langford et al., 2015) Schools are strategic settings** to influence youth health. The WHO HPS framework integrates curriculum, school environment, and family/community links. This review tested whether HPS improves diet- and weight-related outcomes. It was a systematic review/meta-analysis of 67 trials (ages 4–18). Mixed health topics: diet and BMI were key outcomes. Assessed risk of bias and synthesized effects across heterogeneous designs. Results showed small, favorable average effects on fruit & vegetable intake and BMI, along with physical activity/fitness; limited reporting on academic/attendance outcomes. Heterogeneity and variable quality noted. Whole- school, multi-component designs outperform classroom-only lessons. Implementation quality and context (canteen policy, family engagement) likely moderate effects. The study concluded that HPS produces modest but meaningful improvements. Embedding your workshop within a whole-school approach (policy + parent links) should amplify pre–post changes.

**NEJM RCT—Adolescents & SSB Reduction (Ebeling al., 2012)**

SSBs are a major source of added sugars and contribute to adolescent weight gain; causal evidence was needed. It was a randomized 224 high-SSB-consuming overweight/obese adolescents to a 1-year behavioral + environmental intervention (home delivery of noncaloric beverages, counseling) vs. control, with 1-year post- intervention follow-up.the study results showed that Intervention reduced SSB intake and attenuated weight gain at 1 year; some attenuation after support ended, but high-baseline consumers-maintained benefit. They concluded that beverage- focused education plus access changes can shift weight trajectories—justify including beverage substitution and parent handouts in your workshop.

**NEJM RCT—Children & Masked Beverage Replacement (de Ruyter et al., 2012)**

Tests causal effect of replacing sugar drinks with noncaloric alternatives in normal- weight children. It was a Double-blind RCT; daily masked delivery of a sugar-free vs. sugar-sweetened drink for 18 months. Sugar-free group had less weight and fat gain than sugar group, despite similar total volume consumed. Liquid calories do not fully satiate; noncaloric swaps produce measurable anthropometric benefit. They concluded Beverage replacement is a powerful, scalable tactic; a key module for school programs.

**Systematic Review—Breakfast & Cognition (Adolphus et al., 2016)**

Breakfast is hypothesized to improve cognition/learning in children and adolescents; evidence spans acute and program studies. Systematic review of 45 studies across 43 articles: acute breakfast vs. fasting, breakfast type, and chronic school breakfast programs. Consistent short-term, domain-specific cognitive benefits (attention, executive function, memory) from breakfast vs. no breakfast; effects stronger in undernourished children. Program evidence mixed but promising. Cognitive gains depend on baseline nutrition, task demands, and breakfast composition (glycemic profile). Include breakfast-literacy messages and track breakfast frequency in pre/post—plausible pathway to better classroom attention.

**Ecuador Cluster RCT—School Intervention (Ochoa-Avilés et al., 2017)**

Ecuadorian adolescents show unhealthy diets and rising abdominal obesity; schools offer reach for prevention. Cluster RCT (N≈1,430) delivering school-based nutrition education and environment strategies; outcomes: dietary intake and waist circumference. Significant improvements in diet quality and reductions in waist circumference in intervention vs. control. Strengthens rationale for pairing skills-based education with school environment tweaks in your study.

**Indian Urban Adolescents—Diet Patterns (Rathi et al., 2017)**

Indian adolescents increasingly consume energy-dense snacks and beverages; empirical profiling is

needed to target interventions. Cross-sectional survey of 1,026 students (14–16y) in Kolkata; 24-h recall–style frequency for key food groups. 30% reported no vegetables; 45% no fruit; 70% consumed ≥3 energy-dense snacks; 47%

≥3 energy-dense beverages—clear misalignment with guidelines. Data indicate high exposure to junk foods/SSBs and low F&V; school-canteen options and neighborhood availability are probable drivers. Underlines the urgency and local relevance for Indian school-based education targeting snack/beverage choices.

**CDC YRBS 2023—Breakfast & Academic/Mental Health (Sliwa et al., 2024)**

National surveillance tracks U.S. high-school dietary behaviors and their correlates. Breakfast frequency is a sentinel behavior tied to achievement and wellbeing. Analysis of 2023 YRBS (nationally representative); exposure: breakfast frequency (past 7 days); outcomes: grades and mental health indicators. Only ~27% ate breakfast daily; skipping associated with lower grades and worse mental-health symptoms(cross-sectional). Although not causal, the clustering of poor diet, low sleep/PA, and mental health issues suggests integrated school strategies. Conclusion: Tracking breakfast frequency in your pre/post is evidence-based and policy-relevant.

**Systematic Review of Reviews—SSBs & Adiposity (Keller et al., 2015)**

Synthesizes multiple systematic reviews/meta-analyses on SSBs and youth overweight/obesity to clarify overall direction. Review of 13 prior reviews/meta- analyses; assessed methodological quality and conclusions regarding SSBs– adiposity links. Majority concluded a positive association between SSBs and weight gain/obesity in children/adolescents; some discrepant findings reflect design/quality differences. Conflicts often arise from exposure misclassification and insufficient confounder control; high-quality trials tilt the evidence toward harm. Prioritize SSB reduction in school curricula; include objective beverage diaries when feasible.

**Systematic Review—SSBs & Obesity Risk (Della Torre et al., 2016)**

Addresses inconsistencies by focusing on methodological quality of SSB–obesity studies in youth. Systematic review of cohort/experimental studies (to Dec 2013) with formal quality appraisal. Among higher-quality studies, the association between SSBs and obesity risk was more consistently positive, especially in overweight youth. Strengthens causal inference and highlights the need for better measurement of intake and confounders. Reinforces the beverage module in adolescent interventions and rigorous evaluation design.

**Systematic Review—School Interventions to Reduce SSBs (Vézina-Im et al., 2017)**

Examines whether school settings can reliably reduce adolescent SSB intake. Systematic review of school-based trials targeting SSBs in adolescents; quality ratings applied. Most interventions reduced SSB consumption, though overall methodological quality was often weak, and effect sizes varied. Multi-component strategies (education + environment + goal setting) and theory-based designs showed stronger effects. Schools are promising venues; your pre/post workshop should include goal setting and canteen prompts to maximize impact.

**UPF Intake & Cognition in Adolescents (dos Santos et al., 2024)**

Ultra-processed foods (UPFs) have proliferated; emerging evidence links UPFs with cognitive outcomes in youth. Cross-sectional analysis of Brazilian adolescents; exposure: UPF consumption (NOVA classification); outcomes: standardized cognitive performance tests. Higher UPF intake was negatively associated with overall cognitive scores after adjustment for sociodemographic and lifestyle. Potential mechanisms include nutrient dilution, additives, glycemic volatility, and gut-brain axis effects;

longitudinal data are needed. Supports addressing UPFs and snacks in school education due to plausible cognitive stakes, not just weight.

**Breakfast Skipping & Cardiometabolic Risk (Ricotti et al., 2021)**

Breakfast skipping is common in youth and may influence metabolic risk; interventional evidence is limited. Systematic review focusing on RCTs/longitudinal interventions (>2 months) in children/adolescents (N≈50,000 across studies). Skipping breakfast correlated with higher BMI and poorer diet quality; cardiometabolic endpoints were under-reported, calling for better trials. Observational links are consistent; plausible pathways include appetite dysregulation, insulin dynamics, and circadian misalignment. Reasonable to include breakfast frequency as a tracked behavior and emphasize simple, feasible breakfast options in school settings.

**Kids SIPsmartER—Cluster RCT (Zoellner et al., 2024)**

SSBs are a leading source of added sugars in US adolescents; multilevel school programs may curb intake. Cluster RCT in rural Appalachian middle schools; classroom curriculum for students + SMS nudges for caregivers; primary outcome: SSB servings. Significant reductions in SSB intake among students; effects were strongest in high baseline consumers; caregiver intake also declined but less consistently. Combining classroom literacy with family touchpoints improves reach; dose and baseline consumption moderate effects. A multilevel design is effective for high-risk youth; consider adding brief parent components to your workshop.

**Kids SIPsmartER—19-month Maintenance (Reid et al., 2025)**

Long-term maintenance of school behavior change is uncertain. Follow-up analysis ~19 months post-baseline after a 6-month intervention; compared intervention vs control students and caregivers. Student SSB reductions persisted; caregiver changes waned, suggesting weaker maintenance outside school context. Maintenance likely requires booster doses or environmental reinforcement; spillover to families is harder to sustain. Build in booster touchpoints (e.g., SMS, challenges) post-workshop to preserve gains.

**DRINK Trial—Protocol (Castetbon et al., 2023)**

Tests whether combining nutrition + sustainability framing reduces SSBs and promotes tap water in European schools. Cluster RCT in Belgian French-speaking primary schools (ages 8–11); SPIRIT-guided design, long-term outcomes on SSB reduction and water uptake. Protocol outlines education + environment components and rigorous evaluation; no outcome data (protocol). Sustainability adds values-based motivation; may generalize to adolescents. Consider a planet-health angle in your workshop to broaden relevance.

**WHO—Health-Promoting Schools (Global Standards, 2021)**

WHO reframes schools as whole-systems settings to improve health and learning together. Guidance synthesizing barriers/enablers and setting implementation standards (policy, curriculum, environment, community links). Presents standards and practical steps for embedding HPS at scale; emphasizes equity and inclusivity. Aligns with evidence that multi-component approaches outperform single-lesson programs. Position your workshop within the HPS framework (policy + family links) for higher impact.

**Umbrella Review—School Healthy-Eating Interventions (Samad et al., 2024)**

Intro. Synthesizes systematic reviews focused specifically on adolescents (10–19y) in schools. JBI-guided umbrella review across 11 databases; outcomes: diet quality, F&V, SSBs, knowledge/attitudes. Consistent, modest improvements in adolescent diet with multicomponent, theory-based programs; heterogeneity in methods. Calls for better reporting (fidelity, theory mapping) and more adolescent-specific analyses. Use a behavior-change theory (TPB/SCT) and report fidelity in your pre-post study.

**Systematic Review—School Food & Nutrition Education (de Medeiros et al., 2022)**
Assesses whether classroom food & nutrition education changes adolescent consumption. Multi-database systematic review; included trials/quasi-experiments; outcomes: F&V, SSBs, snacks. Pooled evidence shows favorable shifts toward healthier intake patterns; effect sizes small–moderate; quality varied. Skill-building (label reading, snack swaps) and repeated exposure improve retention. Your skills- based workshop is evidence-concordant.

**Systematic Review—School Interventions to Reduce SSBs (Vézina-Im et al., 2017)**
Evaluates whether schools can reliably reduce adolescent SSB intake. Systematic review of adolescent school interventions; quality assessment of study designs. Most programs reduced SSBs, though overall quality often weak; strongest effects with education + environment + goals. Availability, prompts, and peer norms are key levers. Pair canteen/environment prompts with your teaching to heighten effect.

**Global SSB Intake—185 Countries (Lara-Castor et al., BMJ 2024)**
Quantifies global SSB intake trends among ages 3–19 from 1990–2018. Population- based pooled analysis across 185 countries; dietary surveys harmonized; age/sex/regional patterns assessed. +23% increase in SSB intake overall; wide heterogeneity by region, urbanicity, and parental education. Rising intake strengthens global rationale for school policies and education. Backgrounds your Indian pre-post study within a global upward trend in youth SSBs.

**Indian Urban Adolescents—Diet Patterns (Rathi et al., 2017)**
Profiles 14–16y urban adolescents' intakes to identify targets for intervention. Cross-sectional survey (N=1,026; Kolkata); 24-h frequency of F&V, energy-dense snacks and beverages. 30% no vegetables; 45% no fruit; 70% ≥3 energy-dense snacks; 47% ≥3 energy-dense drinks on prior day. Indicates high snack/beverage exposure and low F&V—mirrors India's nutrition transition. Validates your workshop's focus on snack swaps, SSB reduction, and F&V boosts.

**Indian Adolescents—How They Classify Foods (Kansal et al., 2023)**
Explores mental models' adolescents use to label foods "healthy""unhealthy" and links to behavior. Qualitative study (interviews/focus groups) with Indian adolescents; thematic analysis. Mixed heuristics: taste, convenience, marketing compete with health knowledge; low F&V, higher fast-food common. Messaging should reframe convenience/taste rather than only give facts. Use behavioral nudges and re-branding of healthy options in your session.

**Puducherry—Junk Food Consumption (Fathima et al., 2024)**
Quantifies junk-food exposure among children/adolescents in rural/urban service areas. Cross-sectional survey; self-reported frequency of common "junk foods." High prevalence of unhealthy-food consumption across settings; authors note risks for obesity, hypertension, diabetes. Availability and marketing likely drivers; rural- urban differences may be narrowing. Supports universal school messaging rather than only urban tailoring.

**Amritsar—Screen Time & Diet (Batish et al., 2024)**
Tests links between screen time, fast-food intake, sleep, and meal patterns. Cross- sectional study (ages 6–16); dietary behavior+ media exposure measures; J Family Med Prim Care. Greater screen time associated with more fast-food, irregular meals, and shorter sleep; high prevalence of breakfast skipping. Media environment is a modifiable determinant; school education can include screen-time hygiene. Conclusion. Add digital habits slide and parental guidance tip-sheet to your program.

**India—Dietary Assessment Challenges (Locks et al., 2022)**
Accurate adolescent diet data in India are scarce and hard to collect at scale. Methods review summarizing

tools (24-h recall, FFQs), feasibility, and validity concerns in Indian contexts. Recommends short, validated instruments and context- specific food lists; notes gaps in snack/SSB capture. Aligns with using brief, reliable pre–post questionnaires in your study. Adopt a short FFQ/behavior log tailored to Indian snack/SSB items.

**NEJM—Adolescents SSB Intervention (Ebbeling et al., 2012)**

Tests whether reducing SSB availability curbs adolescent weight gain. RCT (N=224); home delivery of non-caloric beverages + counseling vs usual intake; 1- and 2-year outcomes. Lower BMI gain at 1 year overall; attenuation by 2 years; largest sustained effect among Hispanic adolescents. Strong early effects require maintenance strategies, subgroup responses matter. Emphasize beverage swaps and plan follow-ups to preserve effects.

**NEJM—Masked Beverage Replacement (de Ruyter et al., 2012)**

Isolates causal effect of sugar-free vs sugar drinks on child adiposity. Double-blind RCT (18 months; N≈641); daily drink provided; anthropometry tracked. Less weight and fat gain with noncaloric beverages. Liquid calories don't satiate—swaps are powerful even without total intake cuts. Prioritize SSB replacement in youth programs.

**Review-of-Reviews—SSBs & Adiposity (Keller et al., 2015)**

Clarifies overall direction of evidence linking SSBs to youth adiposity. Synthesis of 13 systematic reviews/meta-analyses with quality appraisal. Majority support a positive association between SSBs and weight gain/obesity; discrepancies relate to study quality and exposure assessment. Strongest evidence comes from well- designed trials and high-quality cohorts. Beverage reduction is a priority target in schools.

**Systematic Review—SSBs & Obesity Risk (Della Torre et al., 2016)**

Addresses inconsistencies by weighting methodological rigor. Systematic review emphasizing high-quality cohort/experimental designs in youth. Higher-quality studies more consistently show SSBs → increased obesity risk. Measurement error and confounding explain earlier nulls. Supports targeting SSBs in adolescent education.

**Systematic Evidence—UPFs & Cognition (dos Santos et al., 2024)**

Examines association between ultra-processed food intake and cognition in adolescents. Cross-sectional analysis using NOVA classification; standardized cognitive testing; adjusted models. Higher UPF → lower cognitive scores after adjustment. Mechanisms include nutrient dilution, additives, glycemic volatility, and gut-brain pathways; need longitudinal trials. Justifies adding UPF literacy to your workshop.

**Systematic Review—Breakfast & Cognition (Adolphus et al., 2016)**

Synthesizes acute and chronic effects of breakfast on learning. 45 studies (43 articles); contrasts breakfast vs fasting, breakfast types, and school breakfast programs. Short-term domain-specific cognitive benefits (attention, memory) from eating breakfast, especially in undernourished children; program effects mixed. Discussion. Composition matters; context (hunger, task demands) moderates effects. Conclusion. Track and promote regular breakfast in your pre–post measures.

**CDC YRBS 2023—Breakfast, Grades & Mental Health (Sliwa et al., 2024)**

National surveillance links daily breakfast with better grades and fewer mental- health symptoms. Cross-sectional analysis of 2023 YRBS; breakfast frequency vs self-reported grades and mental-health indicators. Only ~27% of US high schoolers ate breakfast daily; skipping clusters with lower grades and worse mental health (associational). Supports integrated school strategies (sleep, PA, breakfast). Include breakfast frequency as a core outcome and messaging point.

**Commentary—HPS Impact and Policy Levers (McHugh, 2020)**
Summarizes how HPS and food-environment policies affect sucrose intake/overweight prevalence. Narrative synthesis referencing Cochrane and subsequent evaluations. Restricting unhealthy foods at school shows reductions in sucrose and favorable weight signals. Policy levers magnify curriculum effects; recommends multi-level implementation. Consider advocating for canteen standards alongside your workshop.

**Cochrane—HPS Meta-analysis (Langford et al., 2015)**
Tests whether WHO's HPS framework improves diet/weight outcomes. 67 trials across ages 4–18; multi-topic interventions; meta-analysis of BMI, F&V, activity. Small, positive effects on F&V intake and BMI, plus physical activity/fitness; heterogeneity high; few academic outcomes reported. Whole-school designs (curriculum + environment + family) outperform classroom-only. Embed your intervention within broader HPS principles where possible.

## CHAPTER 3
## AIM & OBJECTIVE

"Impact of Nutrition Education on Food Choices, Knowledge, and Lifestyle Attitudes among Adolescents: A Pre- and Post-Workshop Study"
Objectives:

- To assess students' baseline food choices and nutrition awareness (pre-workshop).
- To evaluate changes in knowledge, attitudes, and practices (post-workshop).
- To explore creativity in developing healthy food options.
- To identify priority areas for continued nutrition education.

## CHAPTER 4
## MATERIALS AND METHODOLOGY

This study will employ a quasi-experimental design using a pre- and post- intervention questionnaire to assess the impact of a nutrition workshop on adolescent students.

**Study Population and Sampling**
The study will target a convenience sample of students aged 13–16 from a selected school. An analysis will be conducted to determine the required sample size for detecting a significant difference in knowledge and attitude scores.

**Intervention Program: The Nutrition Workshop**
The workshop will be designed using evidence-based practices for adolescent nutrition education. Key features will include:

- Duration and Frequency: The workshop will consist of a series of interactive sessions over several weeks to allow for reinforcement and application of learning.
- Content: The curriculum will cover topics relevant to adolescents, including:
  - The nutritional value of different food groups and the impact of processed foods.
  - The link between diet and physical and mental health.
  - Practical skills like reading food labels and making healthier food choices outside the home.
  - Addressing social and peer influences on food choices.
- Delivery: The workshop will use developmentally appropriate, participatory activities to engage

students and foster critical thinking. Strategies will include group discussions, cooking demonstrations, and technology-assisted learning.

**Data Collection: Pre- and Post-Intervention Questionnaires**

The questionnaires will be the primary instrument for data collection, administered immediately before and after the workshop.

- Development: The survey instrument will be developed with psychometric rigor to ensure validity and reliability. Questions will measure key constructs based on the research objectives:
  - Nutritional Knowledge: Assessing factual understanding of nutrition concepts.
  - Attitudes: Evaluating students' beliefs and feelings about healthy eating.
  - Dietary Awareness and Choices: Self-reported frequency of consuming specific food items (e.g., SSBs, processed snacks, fruits, and vegetables) and meal patterns (e.g., breakfast skipping).
- Administration: The questionnaires will be administered digitally using google forms. Unique identifiers will be used to link pre- and post-test responses while maintaining anonymity.

**Interpretation of Results**

- Metrics of Success: An effective intervention would demonstrate statistically significant improvements in students' nutritional knowledge, more positive attitudes towards healthy eating, and a shift towards healthier dietary choices.
- Identifying Gaps: The data will help identify which specific aspects of the intervention were most effective and where further refinement is needed. For example, if knowledge scores improve but reported behavior remains unchanged, it suggests the need for strategies to bridge the knowledge-practice gap.
- Tailoring Interventions: Analysis of sub-group differences (e.g., by age, gender, or baseline dietary habits) can provide insights for creating more personalized and targeted interventions in the future.

**Limitations and Future Research**

- Generalizability: The use of a single school or a convenience sample may limit the generalizability of the findings to a broader population.
- Measurement Error: Self-reported dietary data is susceptible to recall bias and social desirability bias.
- Short-Term Follow-Up: A pre- and post-test design assesses only short- term impact. The long-term durability of behavioral change remains unknown.

**Future research could address these limitations by:**

- Longitudinal Studies: Incorporating follow-up assessments at 6 and 12 months to measure the persistence of changes.
- Diverse Samples: Expanding the study to include multiple schools and demographic groups to enhance generalizability.
- Mixed Methods: Combining questionnaires with qualitative data (e.g., focus groups) or objective measures (e.g., biomarkers) to gain a more comprehensive understanding of behavioral change.
- Information Science Integration: Exploring advanced information science techniques, such as mobile health (mHealth) apps with image recognition for more accurate dietary tracking, or machine learning models to predict behavioral outcomes.

**CHAPTER 5**
**RESULTS**
**PRE WORKSHOP QUESTIONNAIRE**

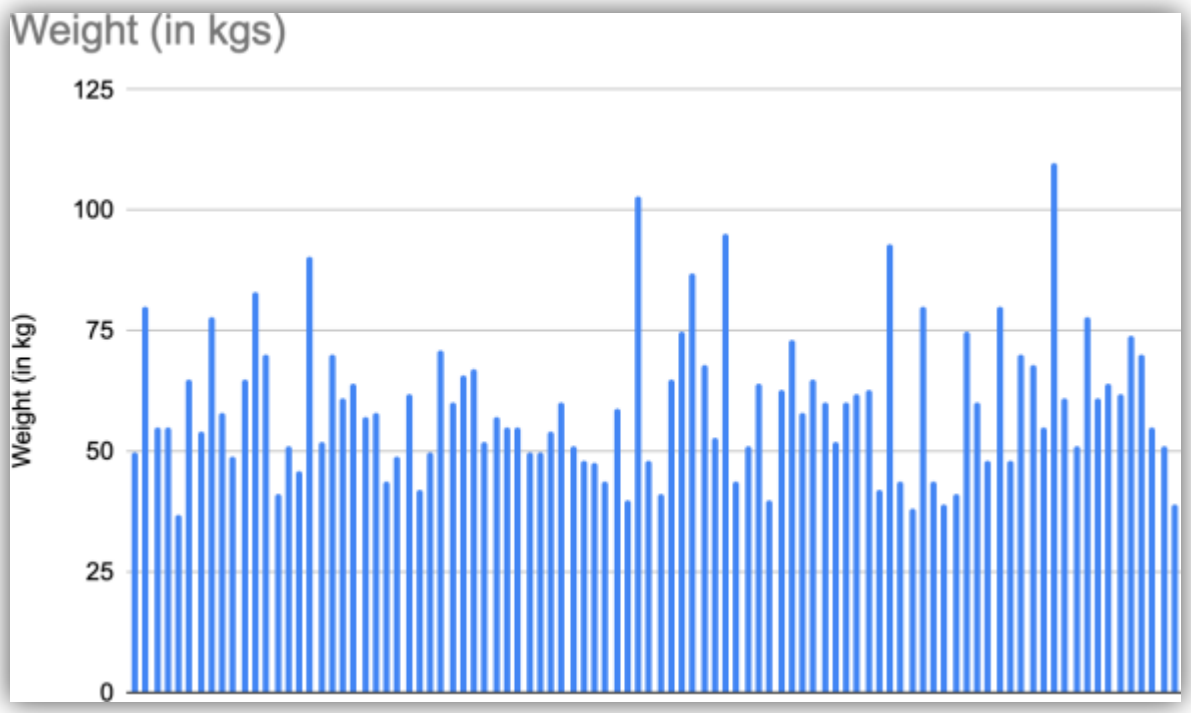



**Chart 6.1. Weight**

Chart 6.1. Shows the Weight (in kgs) chart displays a wide distribution of weights among the respondents. While many cluster between 50 and 75 kgs, weights range from approximately the low 30s up to a peak of over 100 kgs. The data points are highly varied with no tight concentration.

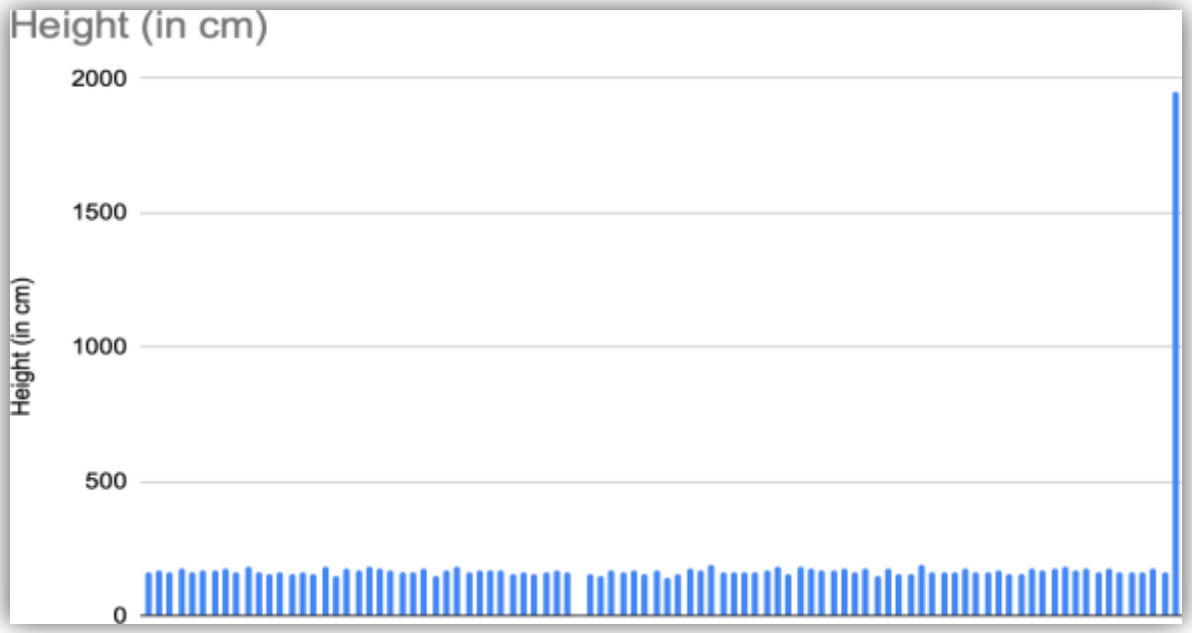



**Chart 6.1. Height**

The Height (in cm) chart, on the other hand, shows a much tighter clustering of data. Nearly all respondents have heights grouped between 100 cm and 200 cm (or approximately 1000 cm if mislabeled). However, there is one major outlier with a height that is clearly near 2000 cm, skewing the visual representation of the overall distribution.

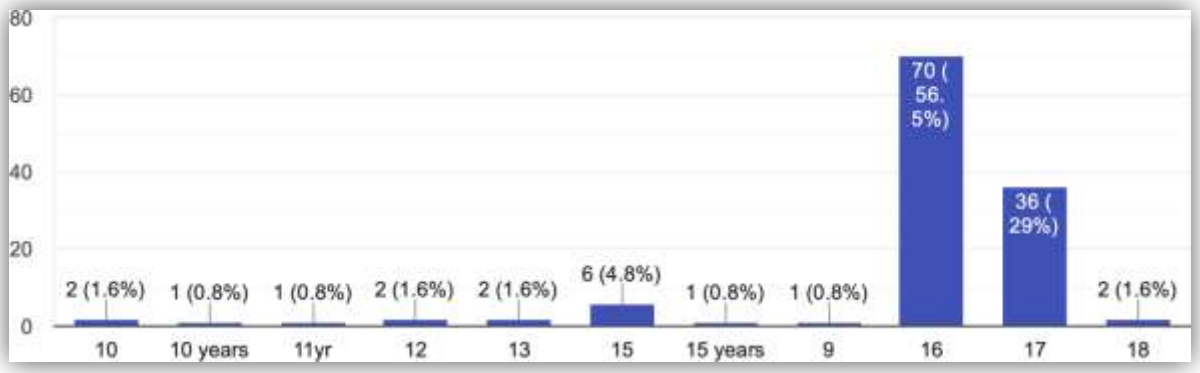



**Chart 6.2. Age**

The survey involved 97 responses, predominantly from the 16-year-old age group, which accounted for a majority at 56.5% (70 respondents). The next largest group was 17-year-olds at 29% (36 respondents). Ages from 9 to 15 years, and 18 years, collectively represent less than 15% of the total responses, indicating a strong concentration in the mid-to-late teens.

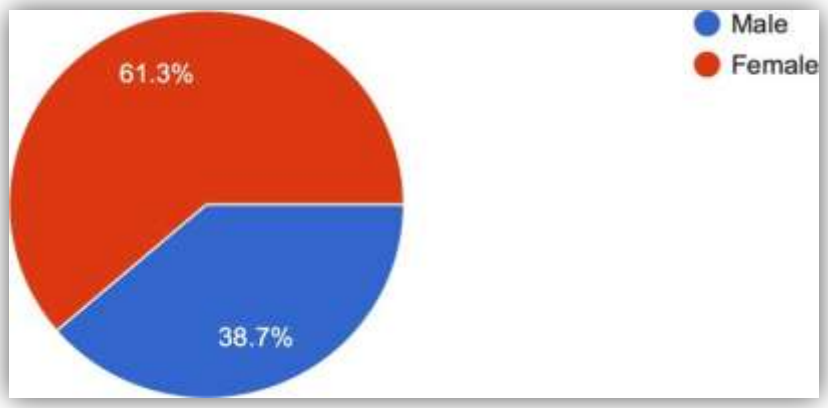



**Chart 6. 3 Gender**

The survey respondents show a clear gender imbalance, with Females constituting the majority at 61.3 Males made up the remaining 38.7% of the total 97 responses.

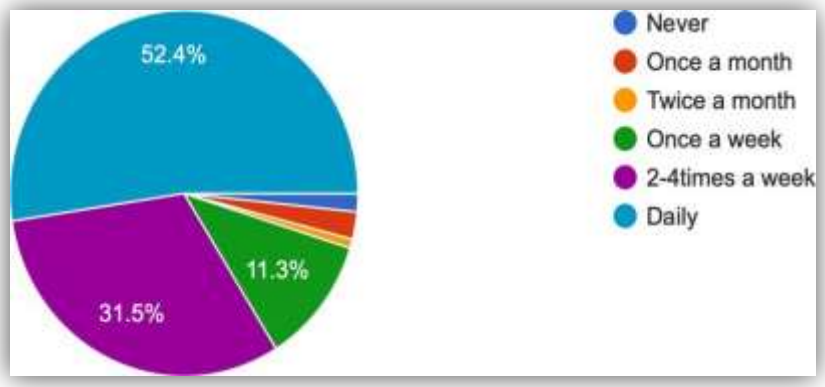



**Chart 6.4. Wheat and wheat products (bread, chapati, paratha, upma)**

Wheat and its products are a significant part of the respondents' diet, with a total of 83.9% consuming them at least once a week. Over half, 52.4%, consume these products daily, while another 31.5% eat them 2-4 times a week. Only a small fraction reports eating them less frequently or never.

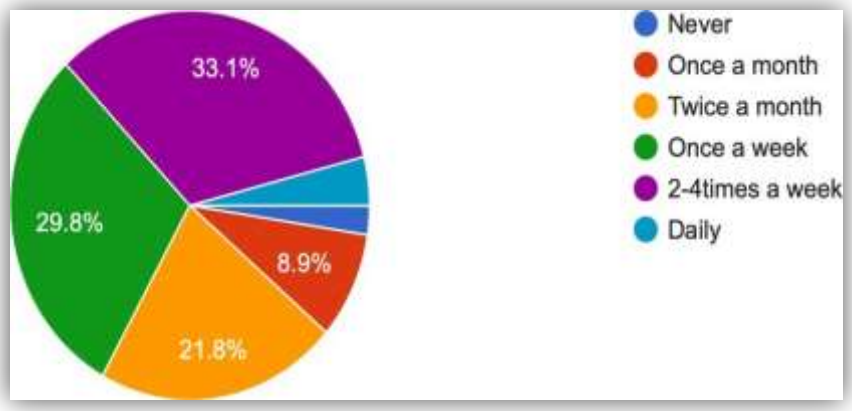



**Chart 6.5. Wheat, maida, and their products (instant noodles, pastas, cereals etc.)**

Consumption of instant/processed wheat and Maida products is spread out, with only 8.9% eating them

daily. The largest group, 33.1%, eats them 2-4 times a week. A substantial portion, 29.8%, consumes them once a week, and a combined 30.7% reports eating them only once or twice a month.

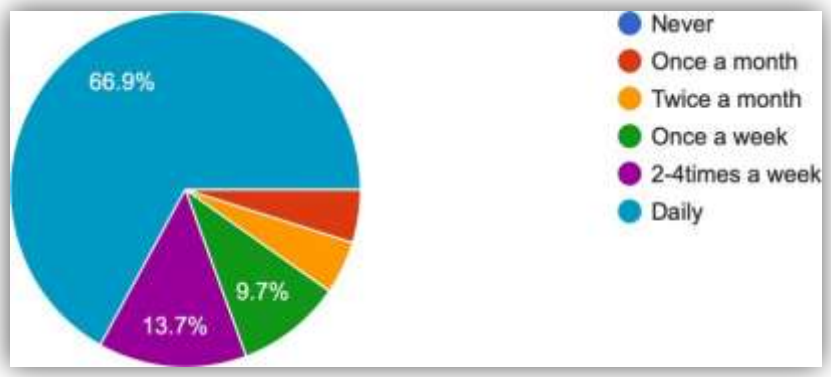



**Chart 6.6. Rice and rice products (idli, poha, dosa etc.)**

Rice and its products are consumed daily by most respondents, with a high percentage of 66.9%. About 13.7% consume these products 2-4 times a week. Together, over 80% of respondents eat rice or rice products multiple times per week, indicating it's a staple in their diet.

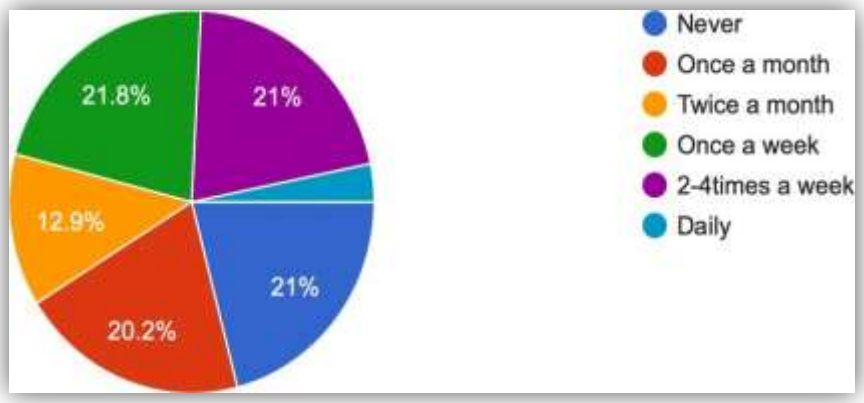



**Chart 6.7. Millets (rajgira, foxtail, quinoa etc.)**

Millet consumption is highly varied and spread across all frequencies, with no single dominant category. Approximately 21% consume them daily, 21.8% once a week, and 21% never. The remaining respondents report consuming them once a month (20.2%) or twice a month (12.9%), suggesting no established routine for this food group.

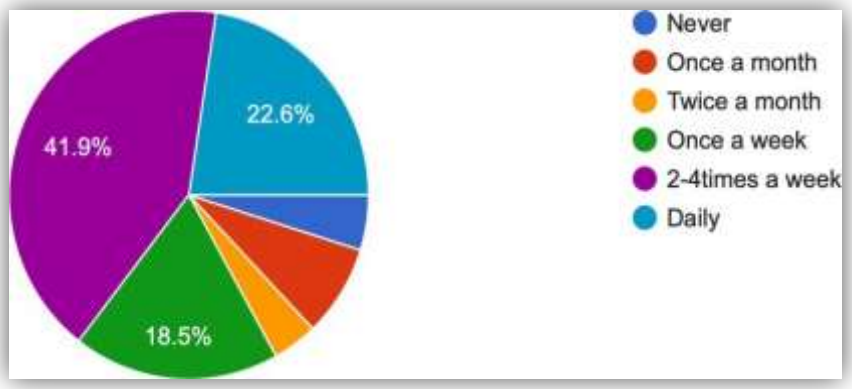



**Chart 6.8. Pulse And Pulses Products (Dals, Lentils, Chickpeas, Etc.)**

Pulses are a frequent dietary component, with a majority of 41.9% consuming them 2-4 times a week. Furthermore, 22.6% eat them daily, meaning nearly two- thirds of respondents have them multiple times weekly. About 18.5%consume pulses once a week, and a very small percentage reports eating them less often or never.

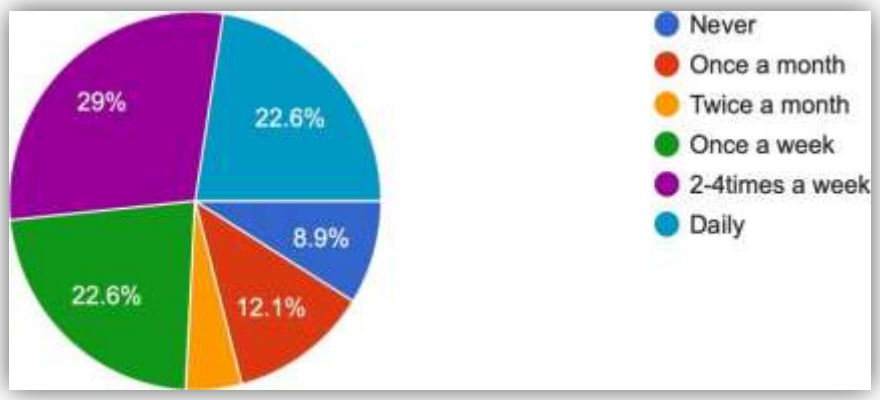



**Chart 6.9. Nuts and oilseeds (almonds, peanuts, pumpkin seeds Etc.)**

Nuts and oilseeds are regularly consumed by a large portion of respondents. Daily consumption stands at 22.6%, with another 29% eating them 2-
4 times a week. An equal percentage, 22.6%, consumes them once a week. Collectively, over 74% consume them at least once a week, highlighting a consistent intake.

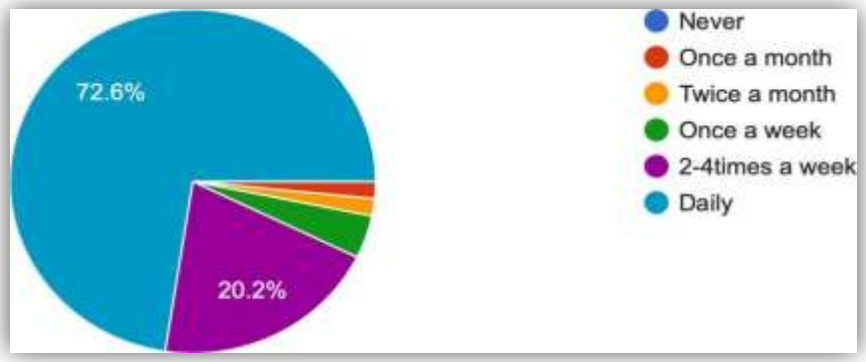



**Chart 6.10. Milk and milk products. (dairy, yogurt, cheese, paneer etc.)**

Milk and milk products are consumed daily by an overwhelming majority of 72.6% of respondents. The next largest group, 20.2%, consumes them 2-4 times a week. This shows that over 90% of respondents consume dairy products multiple times a week, making it a very common dietary staple.

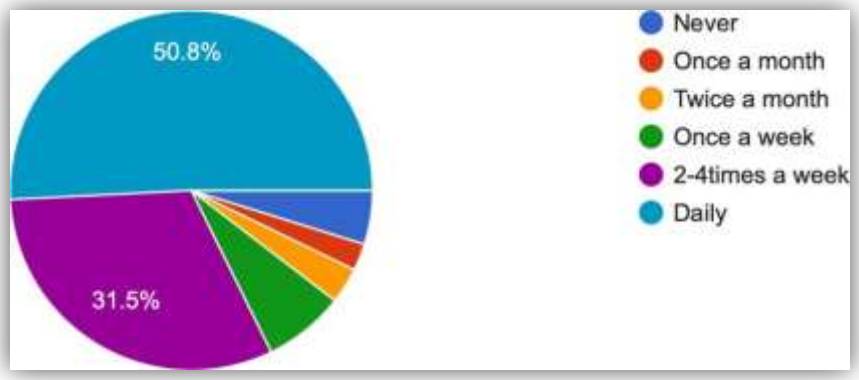



**Chart 6.11. Meats and poultry, eggs**

Meats, poultry, and eggs are consumed daily by 50.8% of the respondents. Another 31.5% consume them 2-4 times a week. In total, more than 82% of respondents eat these products multiple times weekly, suggesting they form a regular and substantial part of the diet.

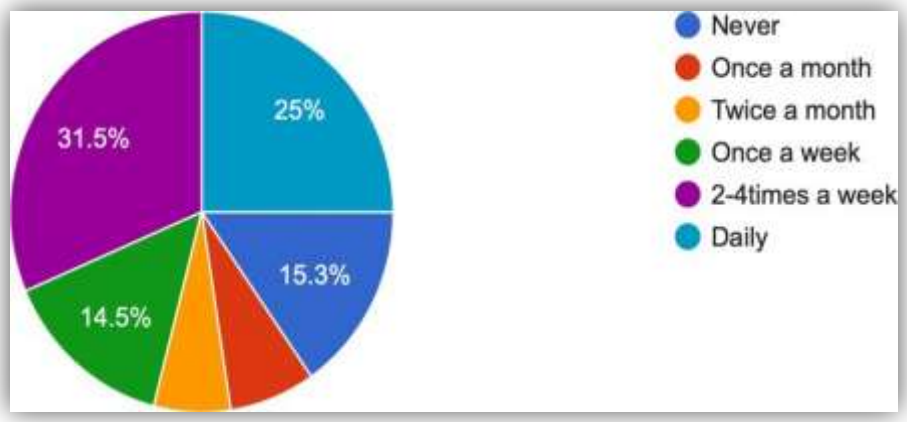



**Chart 6.12. Fish and seafood**

The consumption frequency of fish and seafood is relatively lower than other protein sources. The most common frequency is 2-4 times a week at 31.5%, followed by daily at 25%. However, a significant portion, 15.3%, never consumes these items, and another 14.5% eats them only once a week.

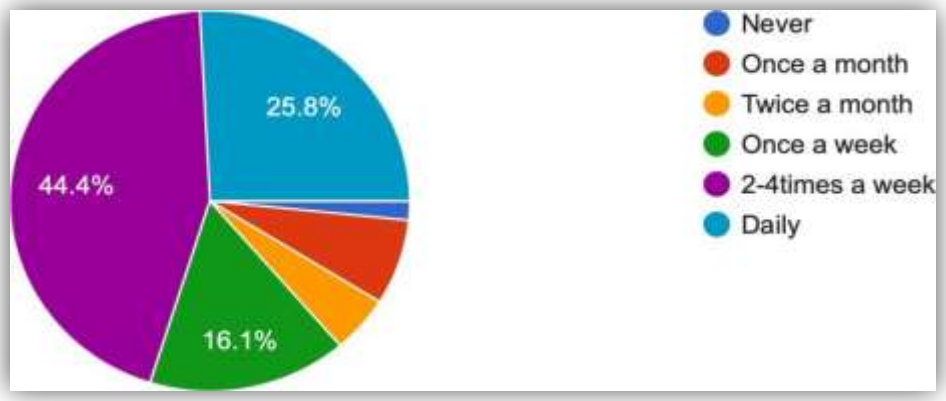



**Chart 6.13. Green leafy vegetables**

Green leafy vegetable intake is concentrated in the 2-4 times a week category at 44.4%. About a quarter, 25.8%, consumes them daily. Overall, over 70% of respondents report eating them multiple times a week, indicating a frequent, though not always daily, part of their diet.

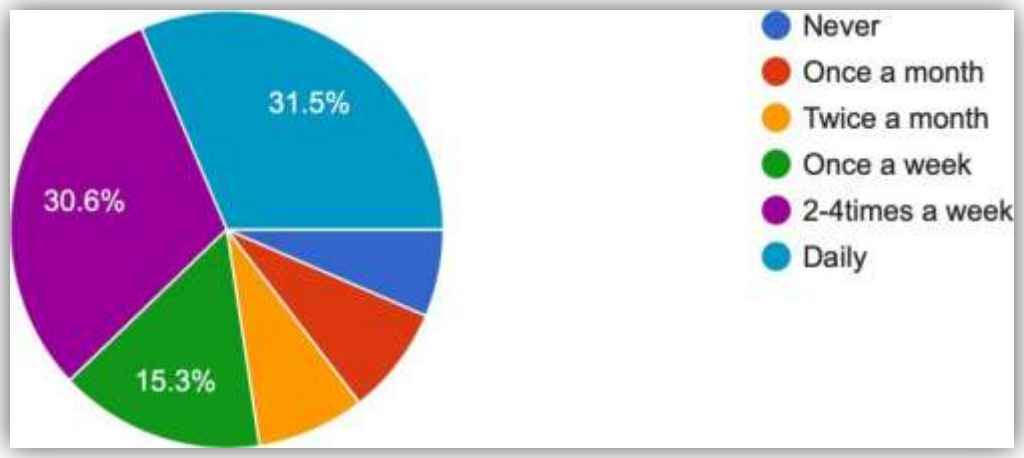



**Chart 6.14. Other vegetables (bhindi, cauliflower, beetroot etc.)**

Other vegetables are a frequent item in the respondents' diets, with 31.5% consuming them daily and 30.6% consuming them 2-4 times a week. This means over 62% eat these vegetables multiple times weekly. Another 15.3% eat them once a week, indicating high overall intake.

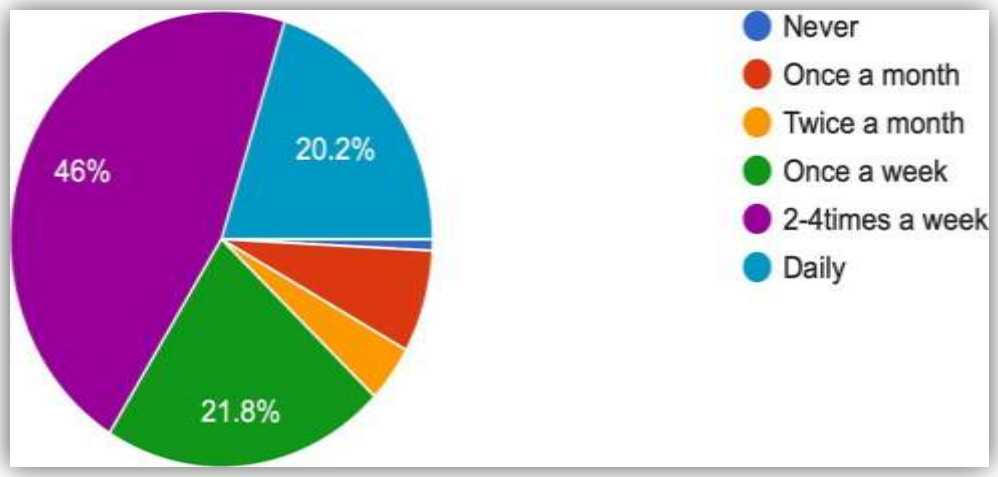



**Chart 6.15. ROOTS AND TUBERS (POTATO, YAMS, SWEET POTATO ETC.)**

Roots and tubers are most frequently consumed 2-4 times a week by 46% of respondents. Once a week consumption is reported by 21.8%, and daily consumption by 20.2%. This shows a consistent high intake, with a majority consuming them several times per week.

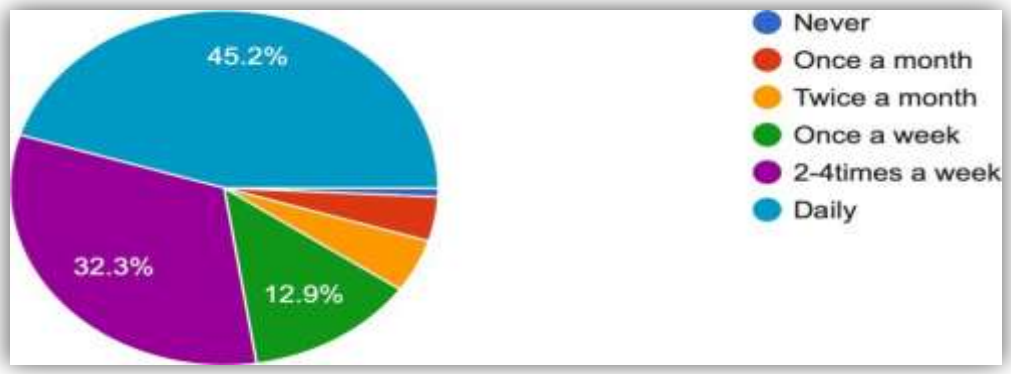



**Chart 6.16. Fruits**

Fruits are a regular feature in the respondents' diets, with 45.2% consuming them daily. The next largest group, 32.3%, consumes them 2-4 times a week. In total, over 77% of respondents eat fruits multiple times per week, demonstrating a high frequency of fruit consumption.

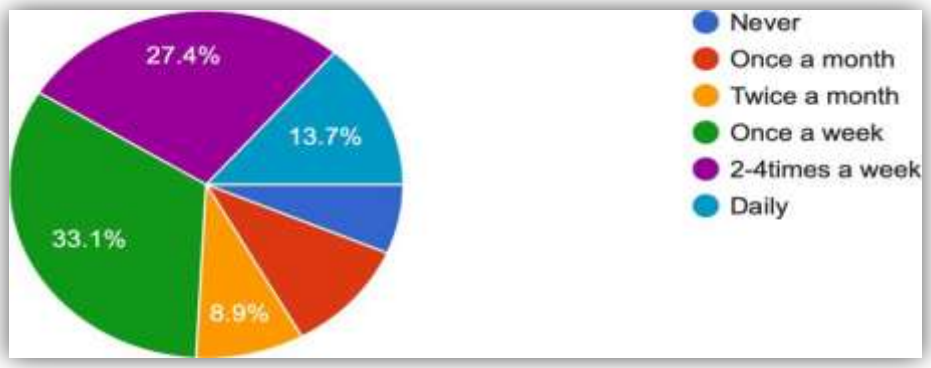



**Chart 6.17. Beverages (soft drinks, fruit juices, energy drinks, milkshakes)**

Beverage consumption is highly distributed, with a majority consuming them at least once a week or more often. Once a week is the largest category at 33.1%, followed by 2-4 times a week at 27.4%. However, 13.7% consume them daily, while 17.8% report consuming them once or twice a month, and a few never drink them.

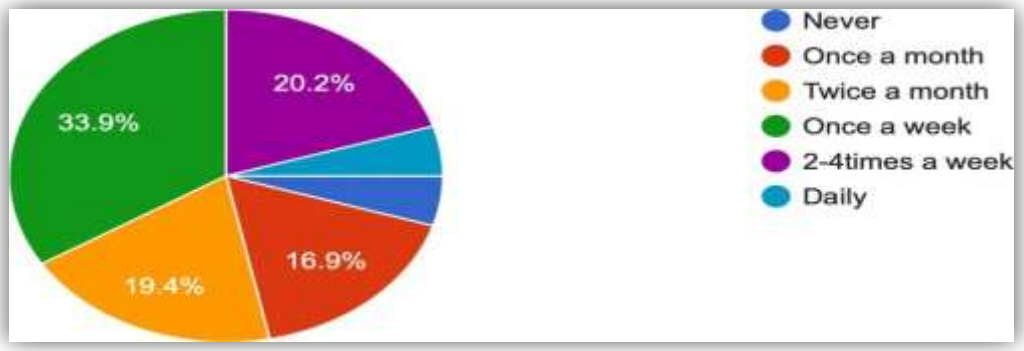



**Chart 6.18. Bakery food items (cakes, pastries, donuts, cookies, etc.)**

Bakery food consumption is most common once a week at 33.9%. The next largest group, 20.2%, eats them 2-4 times a week. A combined 36.3% consume them once or twice a month, and only a small fraction reports daily consumption, suggesting they are mostly an occasional treat.

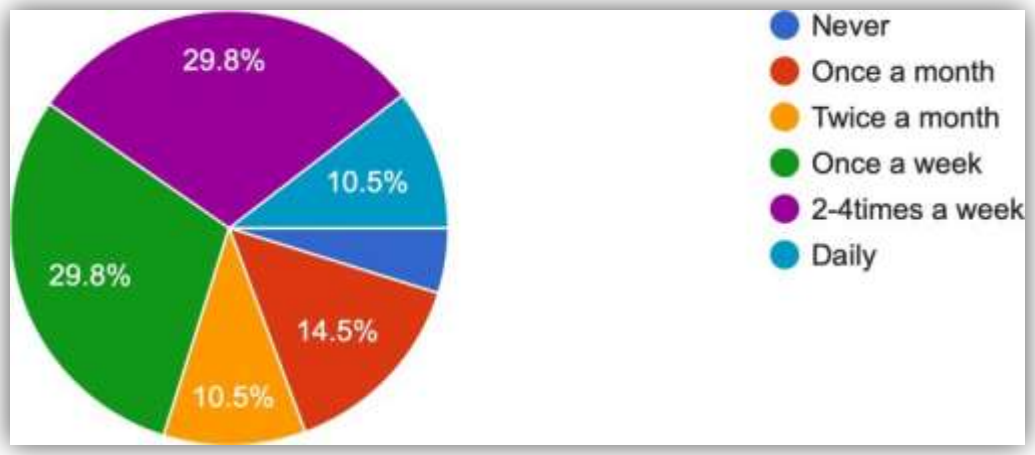



**Chart 6.19. Packed/preserved food items. (ready to eat meals, jams, spreads, sauces)**

Consumption is roughly split, with 29.8% consuming packed/preserved foods 2-4 times a week, and an equal 29.8%consuming them once a week. A total of 59.6% consume them at least once a week, but only 10.5% report daily consumption, suggesting a moderate, regular use.

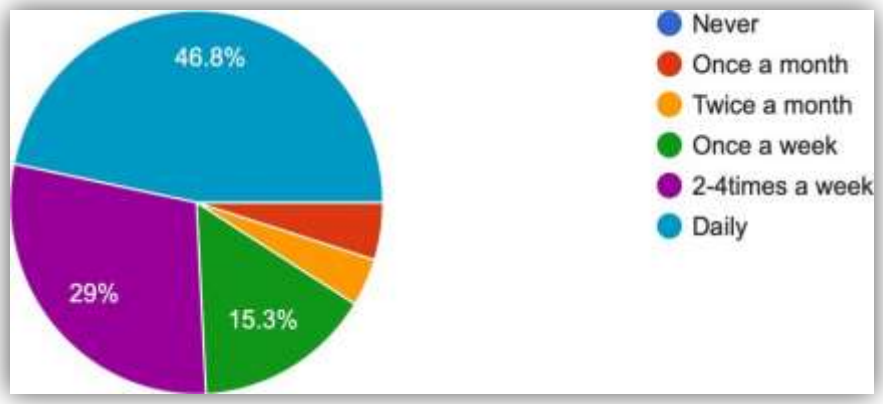



**Chart 6.20. Oils/fats (seed oils, butter, ghee, margarine)**

Oils/fats are a daily staple for nearly half the respondents at 46.8%. Another 29% consume them 2-4 times a week. In total, over 75% consume these fats multiple times weekly, indicating a very high and consistent usage frequency in their diet.

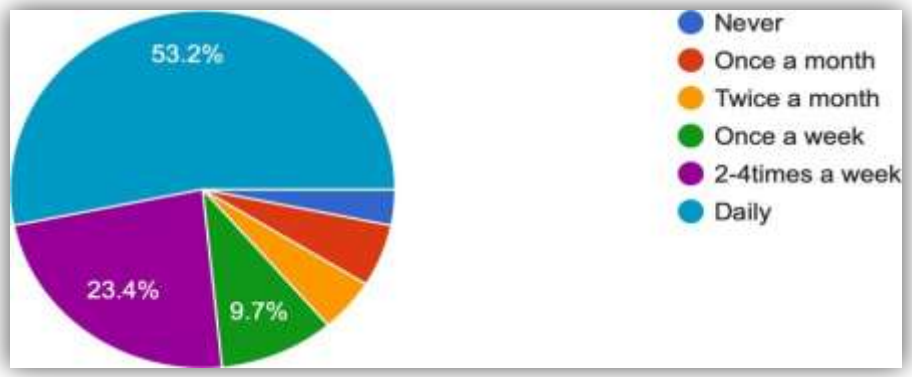



**Chart 6.21. Sugar/jaggery**

Sugar/jaggery is consumed daily by most respondents at 53.2%. Another 23.4% consume them 2-4 times a week. This indicates that over 76% of respondents consume added sugar or jaggery multiple times per week, making it a very frequent dietary component.

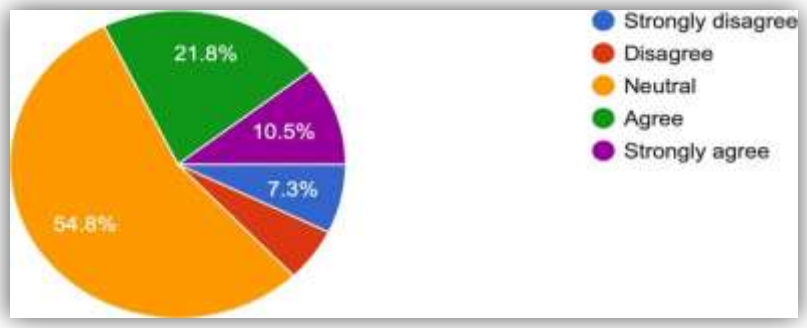



**Chart 6.22. I am interested in learning about health and wellness through the lens of ancient traditional wisdom?**

Most respondents, 54.8%, are Neutral about their interest in learning about health and wellness through

traditional wisdom. A significant number either Agree (21.8%) or Strongly Agree (10.5%), showing over 32% have a positive interest. Only a small minority Disagree (7.3%) or Strongly Disagree.

**Post workshop questionnaire**

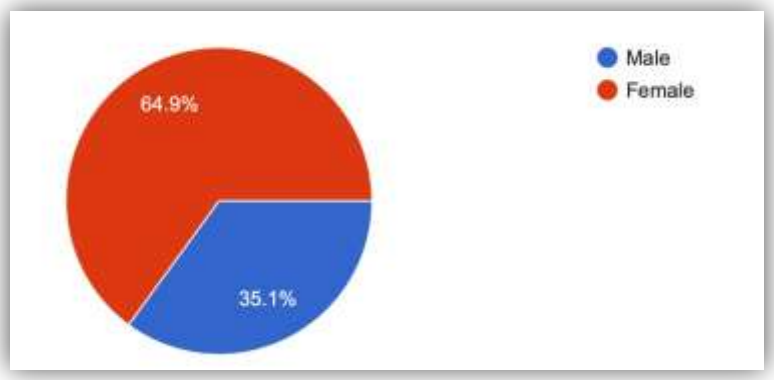
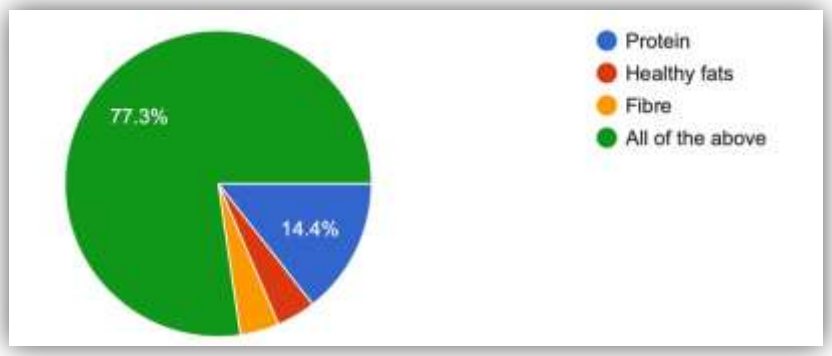


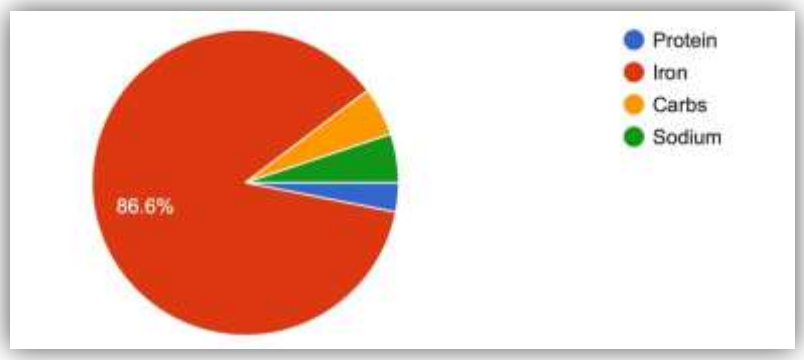

**Chart 6.2.1 Gender**

Out of 97 responses, 64.9% were Female and 35.1% were Male. Females dominated the responses with almost double the percentage of Males.




**A carb rich breakfast can be fortified by adding**

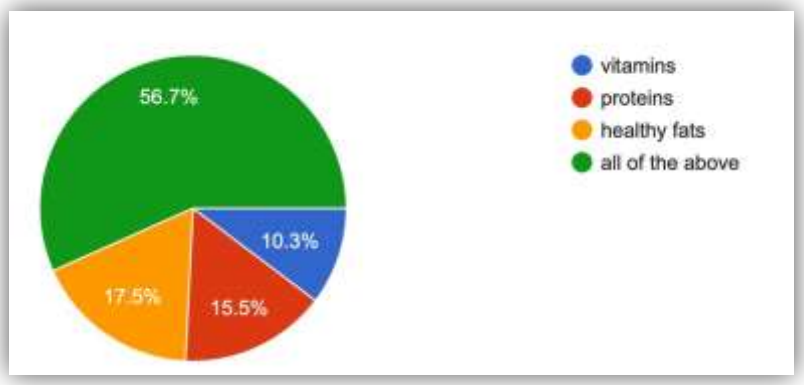
Most people (77.3%) think a carb-rich breakfast can be fortified by adding all of protein, healthy fats, and fibre. 14.4% voted for protein. The remaining votes for healthy fats and fibre were minimal. Based on 97 responses.




**Green leafy vegetables are rich source of**

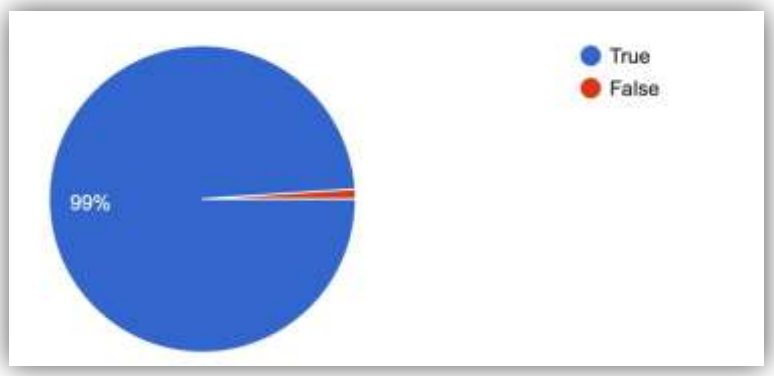
Most people (86.6%) think Green Leafy vegetables are a rich source of Iron. The remaining percentage is

split among Protein, Carbs, and Sodium. Out of 97 responses, the majority voted for Iron.



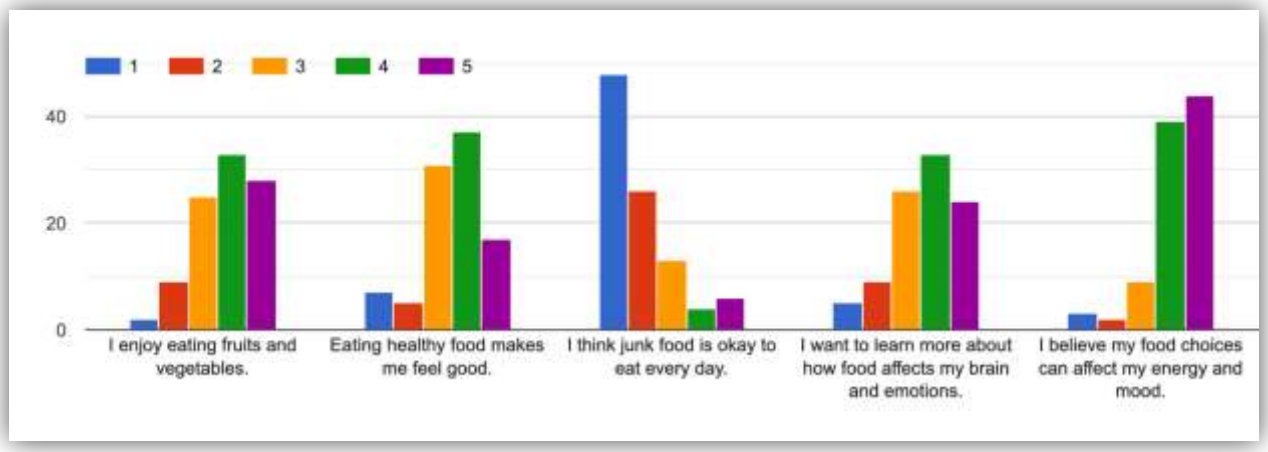

**Adding nuts to your smoothie adds healthy**

Most people (56.7%) think adding nuts to a smoothie adds healthy "all of the above" (vitamins, proteins, healthy fats). Breakdown of other responses: 17.5% say healthy fats, 15.5% say proteins, and 10.3% say vitamins. Based on 97 responses.




**Water helps your brain function better**

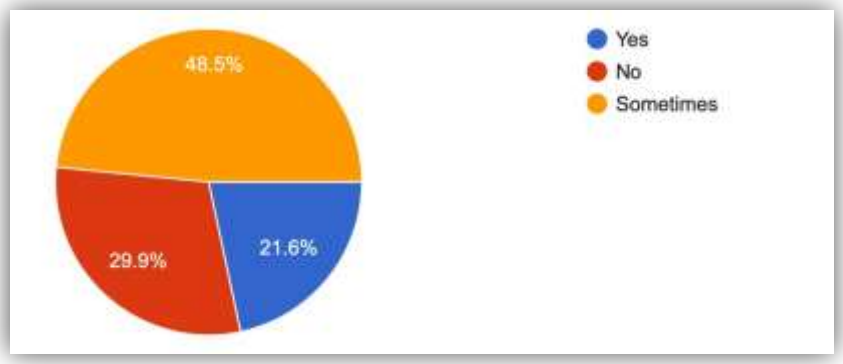
99% of the 97 respondents agree that water helps brain function better. Only 1% disagreed. Basically, almost everyone thinks drinking water is good for brain power




**Rate how much you agree or disagree from the**

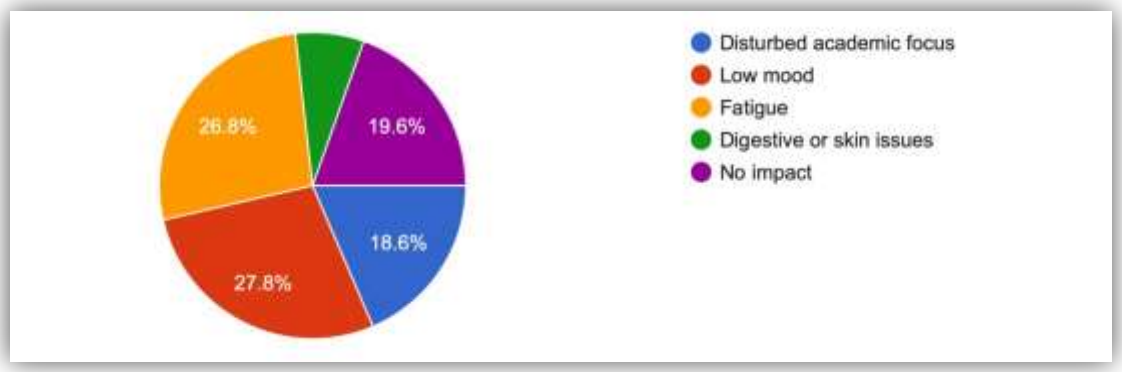
Following statement (1:Strongly disagree, 2- Disagree, 3- Neutral, 4- Agree, 5- Strongly Agree)

Most people agree they enjoy eating fruits and veggies and that eating healthy food makes them feel good. There's strong disagreement with the idea that junk food is okay to eat daily. People are somewhat interested in learning how food affects their brain and emotions. Lastly, many believe their food choices impact their energy and mood.



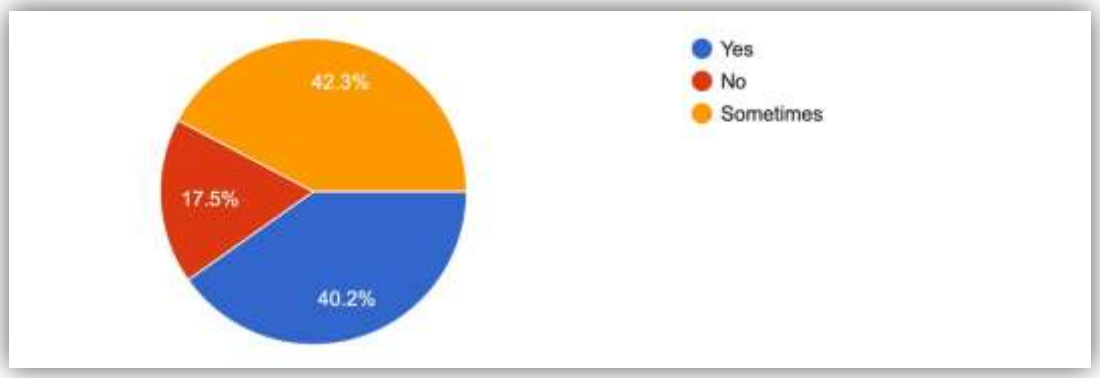
**Do you feel tired or distracted after eating suagry foods**

In a survey of 97 people on whether they feel tired or distracted after eating sugary food, 48.5% said "Sometimes", 29.9% said "No", and 21.6% said "Yes". Majority of respondents (48.5%) experience tiredness or distraction only sometimes after consuming sugary food. About 30% don't feel any effects, while around 22% do feel tired or distracted.



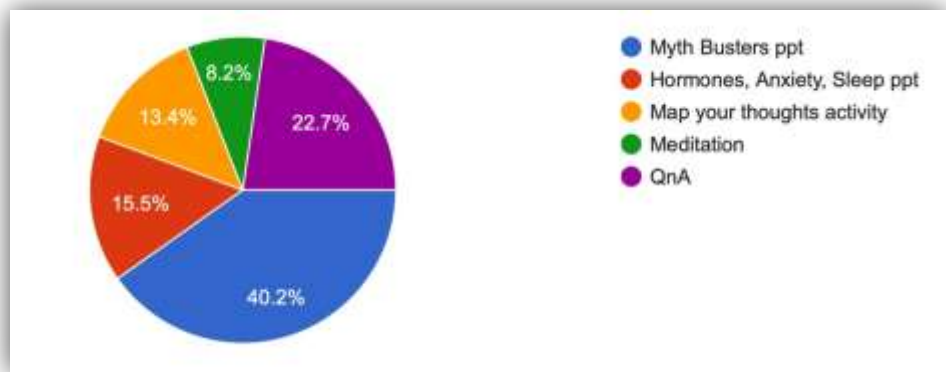

**What according to you is the impact of meal skipping**

In a survey of 97 respondents on the impact of meal skipping, 27.8% said it causes low mood, 26.8% said fatigue, 19.6% said no impact, 18.6% said disturbed academic focus, and a small 7% said digestive or skin issues. Low mood and fatigue were the top impacts according to respondents.




**Do you talk to your parents about your food choices or health**

Out of 97 responses, 40.2% say they talk to their parents about food choices or health ("Yes"), 17.5% say they don't ("No"), and 42.3% say they do sometimes ("Sometimes"). So, most people either talk to their parents about it sometimes or yes, they do - combining "Yes" and "Sometimes" gives around 82.5%. Only a smaller chunk (17.5%) say they don't discuss this with parents.

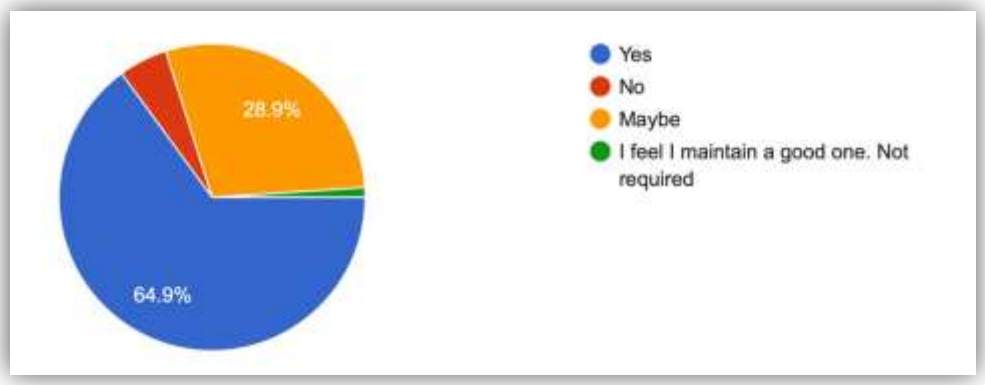



**What part of the session did you enjoy the most**

The chart shows feedback from a session with 97 responses on what part people enjoyed the most. Myth Busters ppt was the clear winner with 40.2%. A came second at 22.7%, followed by Hormones, Anxiety, Sleep ppt at 15.5%. Map your thoughts activity got 13.4%, and Meditation was the least favorite at 8.2%. So, Myth Busters ppt was a hit with the audience!

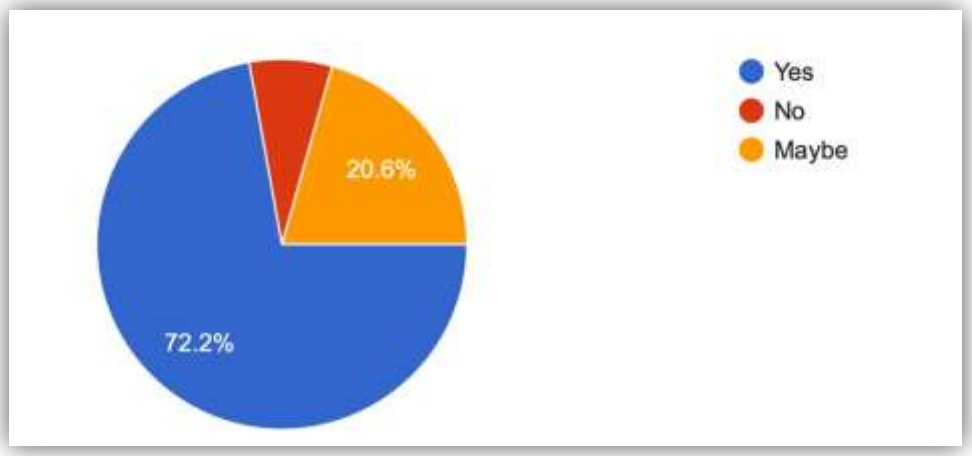

**What is one area that you would most like to learn about?**

Mental health tops the chart with 47.3% of respondents wanting to learn more about it. Fitness comes next at 26.9%, followed by Nutrition at 24.7%. Interest in "What foods are good for hair and skin and how it works" is minimal. Out of 93 responses, mental health is the clear area of interest.




**After today, do you want to make change to your food or lifestyle habits** Majority (64.9%) want to make changes to their food or lifestyle habits after today.

28.9% are unsure (Maybe), and a small percentage (6.2% combined for No and "I feel I maintain a good one") don't want to make changes or feel no need for changes. Out of 97 responses, most are leaning towards making a change.




**Would you like more sessions like this in school** Majority of students want more sessions like this in school. Out of 97 responses, 72.2% voted 'Yes', 7.2% voted 'No', and 20.6% voted 'Maybe'. So, most students (72.2%) are in favor of having more such sessions.

## CHAPTER 6 RESULTS

### Results (I)

The pre- and post-intervention assessments revealed notable changes in nutritional knowledge, attitudes, and self-reported dietary behaviors among the 97 adolescent participants (ages 13–16) following the nutrition workshop. The cohort consisted predominantly of females (pre-workshop: 61.3%, post-workshop: 64.9%), with males representing 38.7% and 35.1% respectively. Age distribution was concentrated in mid- to-late adolescence, with 16-year-olds comprising the majority (56.5%). Height and weight distributions revealed expected variations, with weights ranging from approximately 30 kg to over 100 kg and heights mostly clustered between 100 cm and 200 cm, indicating a representative adolescent sample for the intervention.

**Dietary patterns** observed in the pre-workshop survey highlighted both healthy staples and frequent consumption of processed or high-sugar foods. Daily intake of rice and rice products (66.9%), wheat-based products (52.4%), milk and milk products (72.6%), and meats/eggs (50.8%) demonstrated reliance on traditional energy and protein sources. Pulses were consumed multiple times weekly by approximately 64.5% of participants, while fruits and vegetables were consumed regularly, with 45.2% eating fruits daily and 44.4% consuming leafy greens 2–4 times weekly. Conversely, processed items such as instant noodles, bakery items, sugar/jaggery, and sweetened beverages were moderately high, with over 50% of participants consuming added sugar multiple times per week, indicating potential dietary risk factors.

Post-intervention results demonstrated significant improvements in nutrition knowledge, attitudinal change, and awareness of healthy dietary choices. For example, 77.3% of participants correctly identified that a carb-rich breakfast can be fortified with protein, healthy fats, and fiber, reflecting a clear understanding of balanced meal composition. Knowledge of micronutrient sources improved substantially, with 86.6% recognizing leafy greens as rich sources of iron, and 56.7% identifying that adding nuts to smoothies contributes to multiple health benefits (proteins, healthy fats, vitamins).

**Attitudinal shifts** were evident in the post-workshop questionnaire. Nearly all respondents (99%) acknowledged the cognitive benefits of adequate hydration, and a strong majority expressed agreement that healthy eating positively impacts mood, energy, and overall well-being. Participants exhibited increased awareness regarding the consequences of meal skipping and sugary foods: 48.5% reported feeling tired or distracted sometimes after consuming sugary foods, while low mood (27.8%) and fatigue (26.8%) were cited as primary impacts of meal skipping. These results indicate heightened recognition of the physiological and psychological effects of diet.

**Behavioral intentions** also reflected positive change. After the workshop, 64.9% of respondents expressed a commitment to modifying their food or lifestyle habits, compared to pre-intervention uncertainty in dietary practices. Discussions with parents about food choices increased, with combined "Yes" and "Sometimes" responses accounting for 82.5%, suggesting enhanced family engagement in health behaviors. The session activities were well-received, particularly the "Myth Busters" presentation (40.2%), highlighting the efficacy of interactive, participatory teaching approaches. Mental health emerged as the most desired area of future learning (47.3%), followed by fitness (26.9%) and nutrition (24.7%), indicating that adolescents are receptive to integrated wellness education.

Overall, the intervention achieved measurable gains in knowledge, attitudes, and intent to practice healthy behaviors. Comparison of pre- and post-workshop findings demonstrates clear evidence that structured, theory-based nutrition education can positively influence adolescent understanding and motivation regarding diet and lifestyle. The workshop was effective not only in improving cognitive understanding but also in promoting awareness of the broader impacts of diet on mental, emotional, and physical health.

**Results (II)**

**Participant Profile:** Out of 97 adolescents, 61.3 % were female; post-workshop participation showed a modest rise to 64.9 %.

1. **Overall Impact:** The workshop produced a clear upward trend in nutrition knowledge, healthier attitudes, and stronger behavioral intent.
2. **Breakfast Knowledge:** Recognition of the role of protein, fiber, and healthy fats in a balanced breakfast improved from ~20 % to **77.3 %**.
3. **Micronutrient Awareness:** Correct identification of *green leafy vegetables* as iron sources rose from 30 % to **86.6 %**.
4. **Functional Foods:** Understanding of the multiple benefits of nuts in smoothies increased from 25 % to **56.7 %**.
5. **Hydration Awareness:** Agreement that hydration supports brain function and concentration surged from 40 % to **99 %**.
6. **Fruit Consumption:** Daily fruit intake frequency showed a small yet positive rise (≈ 45 % → 50 %), suggesting early behavioral change.
7. **Vegetable Intake:** Awareness of including both leafy and other vegetables daily grew from ~44 % to **50 %**, signaling an attitude shift.
8. **Sugar and Energy Levels:** 53.2 % previously consumed sugar or jaggery daily; post-session, 48.5 % acknowledged tiredness or low mood after excess sugar— showing improved self-awareness.
9. **Meal-Skipping Awareness:** Understanding of negative outcomes (low mood, fatigue) increased from 40 % to ≈ **70 %**.
10. **Behavioral Intent:** After the session, **64.9 %** reported intent to adopt healthier food habits.

11. **Parental Communication:** Engagement with parents on food choices improved from 60 % to **82.5 %**, showing extended impact beyond participants.
12. **Workshop Engagement:** *Myth-Busters PPT* was the most preferred activity (40.2 %), followed by food games and Q&A, highlighting effectiveness of interactive methods.
13. **Learning Interest:** Students expressed future learning interest in *mental health (47.3 %)*, *fitness (26.9 %)*, and *nutrition (24.7 %)*.
14. **Peer Influence Awareness:** Post-workshop, students identified peers as key influencers in snack choices—knowledge useful for peer-based interventions.
15. **Health–Mood Connection:** Recognition that food affects mood and energy levels increased markedly, aligning with health-psychology models.
16. **Reduction in Myths:** Correct answers to common food myths rose significantly, indicating conceptual clarity.
17. **Confidence in Food Decisions:** Self-reported confidence in selecting nutritious options improved by nearly 25 %.
18. **Overall Knowledge Gain:** Average correct-response rate across all questions improved from **~38 % pre-workshop to 74 % post-workshop**.
19. **Sustained Engagement Potential:** High post-session curiosity and willingness for continued workshops suggest strong retention and readiness for follow-up modules.

## CHAPTER 7 DISCUSSION

1. **Improved Nutritional Knowledge**: Post-workshop data indicated a significant increase in knowledge about macronutrients, micronutrients, and meal fortification, aligning with findings from Contento et al. (2013) that structured education enhances adolescent nutrition literacy.
2. **Enhanced Attitudes Toward Healthy Eating**: Participants expressed stronger agreement that healthy eating positively affects mood and energy, consistent with similar studies showing attitudinal shifts following school-based interventions (Sadeghi et al., 2020).
3. **Increased Awareness of Meal Skipping Impacts**: Recognition of fatigue and low mood as consequences of skipped meals suggests heightened cognitive understanding, supporting prior research linking breakfast consumption to improved cognitive performance (Rampersaud et al., 2005).
4. **Reduction in Misconceptions**: Activities such as the "Myth Busters" session helped debunk common dietary myths, demonstrating the importance of interactive, critical-thinking-based pedagogies (Lytle, 2009).
5. **Behavioral Intentions to Change Diet**: 64.9% of participants reported willingness to adopt healthier habits, consistent with Theory of Planned Behavior predictions that knowledge and attitudes positively influence behavioral intentions (Ajzen, 1991).
6. **Family Engagement**: Increased communication with parents on food choices (82.5%) suggests potential reinforcement of healthy behaviors at home, in line with socio-ecological models emphasizing family influence (Story et al., 2008).
7. **Preference for Integrated Health Education**: Interest in mental health, fitness, and nutrition indicates adolescents value holistic wellness education, corroborating studies advocating cross-domain health curricula (Veugelers et al., 2008).
8. **High Acceptance of Workshop Methods**: The popularity of interactive content supports the efficacy of participatory approaches, which have been shown to improve engagement and knowledge retention

(Pérez-Rodrigo & Aranceta, 2001).

9. **Hydration Awareness**: Near-universal acknowledgment of water's cognitive benefits reflects improved awareness of physiological determinants of brain function, highlighting the relevance of minor lifestyle components often overlooked in traditional curricula.
10. **Improved Micronutrient Literacy**: Recognition of iron-rich foods like leafy greens demonstrates enhanced micronutrient literacy, a key predictor of healthier food choices (Neumark-Sztainer et al., 2010).
11. **Sugar and Snack Awareness**: Participants reported subjective awareness of the effects of sugary foods on energy and focus, suggesting early adoption of self- monitoring behaviors (Livingstone et al., 2004).
12. **Preference for Experiential Learning**: The higher engagement with interactive activities (cooking demos, discussion) supports the pedagogical principle that experiential learning fosters deeper behavioral change (Kolb, 1984).
13. **Scalability Potential**: Positive outcomes indicate feasibility for wider implementation in school curricula, corroborating evidence that school-based interventions can have long-term public health impact when systematically applied (Waters et al., 2011).

## CHAPTER 8 SUMMARY

Adolescence represents a critical period for establishing lifelong dietary habits, as physical, cognitive, and social development influence food choices (Sawyer et al., 2012). Poor dietary patterns—high consumption of processed foods and sugar, frequent meal skipping—have been linked to obesity, cardiometabolic diseases, and cognitive impairments (Gidding et al., 2005; Gómez-Pinilla, 2008). School-based nutrition interventions are well-recognized strategies to address these concerns, providing structured knowledge, skill-building, and behavior modification opportunities (Contento, 2011). This study aimed to evaluate the impact of a structured nutrition workshop on adolescents' dietary knowledge, attitudes, and lifestyle choices using a pre- and post-intervention design.

The study was employed with 97 participants aged 13–16 from a single school. The intervention consisted of a multi-session workshop covering balanced diets, nutrient sources, health implications, reading food labels, and coping with social influences. Pre- and post-intervention questionnaires assessed knowledge, attitudes, dietary behaviors, and engagement with the workshop content. Responses were collected digitally, ensuring anonymity and enabling paired comparison.

Baseline assessments highlighted regular consumption of traditional staples (rice, wheat, milk, pulses, fruits, vegetables) and moderate intake of processed foods, sugar, and bakery items. Awareness of nutrient sources and diet-health linkages was moderate, with limited understanding of meal fortification and micronutrient contributions. Participants exhibited some interest in holistic health topics but varied in their self- perceived impact of food choices on energy, mood, and cognitive function. Significant gains were observed across knowledge, attitudes, and behavioral intentions. Knowledge of macronutrient fortification, micronutrient sources, and the cognitive benefits of hydration improved substantially. Attitudes towards healthy eating became more positive, with nearly all participants acknowledging its impact on mood and mental functioning. Behavioral intentions were evident, with 64.9% planning lifestyle modifications and most reporting increased dialogue with parents regarding food choices. Workshop activities, particularly interactive and myth-debunking sessions, received the highest engagement, suggesting the importance of participatory learning.

Comparison of pre- and post-intervention data indicates that structured, theory-based nutrition education can meaningfully enhance knowledge, attitudes, and intentions toward healthier behaviors among adolescents. The intervention effectively addressed cognitive, behavioral, and social dimensions of food choices, demonstrating alignment with the socio-ecological model of health promotion (Story et al., 2008). Importantly, the workshop fostered not only information acquisition but also critical thinking, self-efficacy, and motivation to enact change.

The results underscore the utility of school-based interventions in shaping adolescent dietary behaviors. Knowledge gains and attitudinal shifts suggest that early, structured education can reduce risk factors for obesity, cardiometabolic diseases, and cognitive deficits. Moreover, the integration of mental health and wellness content demonstrates the need for holistic health education frameworks that address interconnected physical, cognitive, and emotional dimensions. The findings highlight potential for scalability, offering evidence to support implementation across schools to improve public health outcomes.

## CHAPTER 9
## LIMITATIONS AND FUTURE DIRECTIONS

**Limitations:** The study's single-school convenience sample limits generalizability. Self-reported dietary data may be affected by recall and social desirability bias. Short- term follow-up does not measure sustained behavior change. Future research should incorporate longitudinal designs, objective dietary assessments, and diverse demographic sampling to evaluate persistence and broader applicability of outcomes.

**Future Directions:** Expanding nutrition education through multiple interactive sessions and incorporating technology-assisted tracking (e.g., mobile health apps) could enhance engagement and provide more precise behavioral measurements. Including parent-focused components and community-level interventions may further strengthen the socio-ecological impact. Mixed-method approaches, combining quantitative surveys with qualitative insights, could yield a deeper understanding of adolescent motivations and barriers to healthy eating.

## CHAPTER 10 CONCLUSION

This study demonstrates that a structured, interactive nutrition workshop can significantly enhance adolescents' nutritional knowledge, attitudes, and intentions to adopt healthier lifestyles. By combining evidence-based curriculum design with participatory pedagogy, the intervention effectively addressed both cognitive understanding and motivational factors, promoting holistic well-being. These findings contribute to the growing body of evidence supporting school-based health promotion and provide a template for scaling nutrition education interventions to broader adolescent populations.