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Content Analysis of Textbooks of Primary Schools of the Government of Khyber Pakhtunkhwa for Nutrition-Related Topics – A Qualitative Study from KP Province of Pakistan

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ABSTRACT

This paper discusses how nutrition-related topics are represented in textbooks used by the primary school-going children of the government schools of Khyber Pakhtunkhwa (KP), Pakistan. Recognizing the important role nutrition education plays in promoting healthy lifestyles and preventing malnutrition, this study aims to evaluate the adequacy, accuracy, and integration of nutrition-related concepts within the school curriculum. A qualitative content analysis was done on textbooks of key subjects Science, Mathematics, Social Studies, and Urdu across Grades 1 to 5. The content analysis was to identify the coverage of essential topics on nutrition including food groups, essential nutrients, hygiene, malnutrition, and dietary habits, and assess the systematic introduction and reinforcement of the concepts across various grade levels and subjects. Results suggest that while concepts of basic nutrition are well integrated into the curriculum, gaps lie in the aspects of depth, consistency, and practical application. The most serious issues identified were the low inclusion of micronutrients and malnutrition; subject integration is broken up, interaction and real-life applications are weak, and content is not adequately contextualized in relation to local dietary practices. These gaps reduce the effectiveness of nutrition education in equipping students with the knowledge and skills necessary to make informed dietary choices. This study underscores the need for curriculum improvements to ensure a more comprehensive and structured approach to nutrition education. It suggests greater interdisciplinary integration, inclusion of practical learning activities, and incorporation of culturally relevant dietary examples to enhance students' understanding and application of nutrition knowledge. Improving nutrition education at the primary level can be beneficial in the long run to address malnutrition and improve dietary habits among the future generations in KP.

Keywords: nutrition education, primary education curricula, pedagogy, government of Khyber-Pakhtunkhwa, Higher education Department (HED)

Introduction

Nutrition education plays an important role in the healthy growth of children as well as helps prevent malnutrition among them. This will not only shape their lifelong dietary behavior but also empower individuals with the knowledge to make sound food choices. Proper nutrition to children fosters cognitive development, academic performance, as well as overall well-being. In Pakistan as well as other developing countries, malnutrition remains one of the significant public health challenges with high rates of stunting, wasting, and micronutrient deficiency in children. Such issues usually result from poor dietary practices, lack of awareness, and limited access to nutritious foods.[1]

Pakistan has made efforts to address malnutrition through various public health initiatives, [2-10] but one of the most sustainable and effective strategies is integrating nutrition education into school curricula. Schools serve as a fun-

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damental platform for early intervention,[12] providing an opportunity to instill healthy eating habits from a young age. The quality and comprehensiveness of nutrition-related content in textbooks can significantly influence students' understanding and attitudes toward food and health. Recently, Khyber Pakhtunkhwa province has made great efforts in curriculum reforms, and adopted textbooks based on national standards and global health recommendations.[12] The efforts of Higher Education Department (HED) of KP for curriculum of higher education are seminal. Yet, to what extent the nutrition education content is appropriately placed in the textbooks of primary schools remains unclear. The objective of this study is to assess how nutrition topics are portrayed through an analysis of primary school textbooks in KP. Specifically, it examines whether the content aligns with national dietary guidelines, international health standards such as those set by the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF), and whether it sufficiently addresses key nutritional issues prevalent in Pakistan.

By conducting a systematic content analysis of these textbooks, this study seeks to identify gaps, strengths, and potential areas for improvement in nutrition education. The results can thus be used as valuable insights by curriculum developers, policymakers, and educators to help schools play an enhanced role in nutrition literacy. In the end, building strong nutrition education in primary school contributes to long-term health improvements because future generations would be equipped with the knowledge and habits needed to fight malnutrition and its risks to health.

Methodology

This research applied a qualitative content analysis methodology to explore the richness and adequacy of nutrition-related material in textbooks of Grade 1-5 primary schooling in KP. The chosen books were Science, Social Studies, and Urdu because these are the core subjects that should include health and nutrition concepts for delivery in school.

Textbook Selection

Textbooks that were studied were those prescribed officially by the Khyber Pakhtunkhwa Textbook Board (KPTB) for the students of primary school (https://tbb.kp.gov.pk/). Books have been selected as they were relevant to health and nutrition education. Science and Social Studies often have lessons about food, health, and hygiene. Urdu textbooks have been included in the study to see whether nutritional concepts were integrated into language lessons, stories, or moral teachings.

Analytical Framework

The content analysis was conducted along key nutritional themes to assess the depth and efficacy of nutrition education in these books. The themes were derived from national dietary guidelines, WHO and UNICEF recommendations, and previous studies on nutrition education. The main categories of analysis included:

1. Balanced Diets – The availability of information on food groups, recommended daily intake, and the need for dietary diversity.
2. Essential Nutrients – Coverage of macronutrients (carbohydrates, proteins, fats) and micronutrients (vitamins and minerals) essential for child growth and development.
3. Food Sources – Discussion on local and accessible sources of nutrition, such as fruits, vegetables, grains, dairy, and protein sources.
4. Hygiene and Food Safety – Information on proper food handling, safe drinking water, handwashing, and hygiene practices to prevent foodborne diseases.
5. Malnutrition – Causes, effects, and control measures of undernutrition, stunting, wasting, and micronutrient deficiencies

Data Collection and Analysis

Based on the analytical framework, each book was analyzed with nutrition-related content instances marked and categorized. The analysis was carried out based on the three broad aspects:

- Frequency – How frequently the nutritional topics cropped up in the books with respect to the different subjects and grade levels.
- Accuracy – Whether the information provided was in line with scientifically accepted nutritional knowledge and health guidelines.
- Pedagogical Approach – The way in which nutritional concepts were presented, including the use of illustrations, photos, diagrams or any other pictorial presen-

tations, storytelling, interactive activities, and real-life examples or case studies.

Data was coded thematically with thematic coding to identify patterns, gaps, and inconsistencies in different grade levels and subjects. Particular emphasis was placed on how the content was age-appropriate and how well it fostered critical thinking and practical application of nutrition knowledge among students.

Results and Discussion

Content analysis of primary school textbooks in Khyber Pakhtunkhwa (KP) has revealed many important insights about the strengths and gaps of nutrition education. This study highlights where the curriculum appropriately covers fundamental nutrition concepts and which areas need to be improved so that they may align with national and global health recommendations.

1. **Limited coverage of nutrition concepts:**
2. The textbooks included basic information on food names, hygiene, and general healthy eating habits; however, there was a noticeable lack of depth in certain critical areas of nutrition education. Topics such as micronutrient deficiencies (e.g., anemia, vitamin A deficiency, iodine deficiency disorders), the impact of poor nutrition on child development, and food sustainability were either minimally addressed or entirely absent (Figure 1).

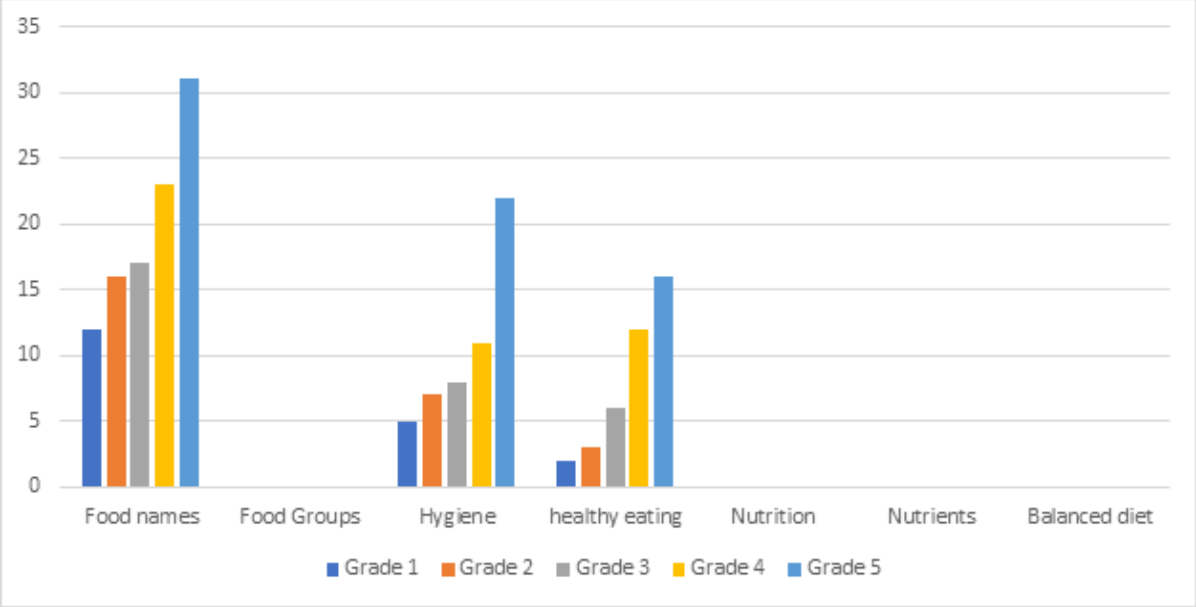

Fig 1. Comparison of the number of health-related messages in the primary school textbooks of KP province

As malnutrition continues to pose a major public health issue in Pakistan, [2-10] less emphasis on its presentation in learning materials might mean that students lack proper insight into the reasons behind poor nutrition and the impact that comes with it. In addition, a significant finding from the study reveals that macronutrients-including proteins, carbohydrates, fats-were actually mentioned, although micronutrients-vitamins and minerals-that are just as important in helping prevent malnutrition and generally leading to health well-being were neglected. This absence may create knowledge gaps in this area for pupils.

2. Incohesive Integration Across Curricula:

Findings also indicated that nutrition-related information was not systematically incorporated across various subjects. This created inconsistencies in the ways nutrition concepts were presented to students as well as reinforced. For example:

- Science textbooks provided basic biological and physiological content connected with food and digestion; however, they were not developed to explain in detail how each of the nutrients may contribute to health.
- Social Studies books occasionally touched upon food culture and agriculture but were not structured for discussion on nutrition as a public health issue.
- Urdu books contained stories or moral lessons in which food items were sometimes referenced but did not explicitly teach the concepts of nutrition.

This fragmented approach made it difficult for students to develop a cohesive understanding of nutrition, as the

information was scattered and lacked continuity across grade levels. A more interdisciplinary approach could help reinforce key nutrition messages across multiple subjects in a structured and engaging manner. [13]

3. Lack of Practical Application in Nutrition Education

The other significant finding was the emphasis on theoretical knowledge rather than applied knowledge. Though the textbooks contain definitions and descriptions of food groups and hygiene, the following are found lacking:

- Guidance on meal planning – No examples of balanced meals or dietary recommendations based on age groups.
- Interactive learning activities – Minimal use of case studies, experiments, or real world applications to encourage active learning.
- Examples of indigenous food – Lack of local indigenous food or locally sourced and affordable food that children could use to help them make healthier choices at home in line with their economic and cultural backgrounds. The inclusion of hands-on exercises, for example, meal planning, school gardening, or storytelling about food items could better equip the students to apply information acquired about nutrition in their activities.

4. Cultural and Contextual Gaps

One of the strong observations was that many of the contents on nutrition did not actually reflect the folk and dietary practices of the region. Too many examples in the textbooks were generic or urban-centric, totally bypassing the diverse food habits and issues of access for students coming from various places in KP, especially rural areas. For example:

- Western dietary patterns examples were provided: sandwiches and cereals rather than traditional Pakistani diets that the children are likely to consume.
- Limited discussion of the staple local food items like wheat, lentils, dairy products, and fruits and vegetables within the seasons-which are highly nutrient-dense and culturally applicable.
- The aspect of family food habits and food wisdom within families in molding nutrition for children has been almost avoided. The incorporation of region-specific dietary habits, locally available foods, and traditional recipes into textbooks can make nutrition education more meaningful and relatable for students and their families. It can thus become more applicable to the lives of students and their families.

5. Lack of Pedological Approach

The analysis of the curricula revealed a huge gap in terms of pedological approach towards nutrition and health. There were no stories, case studies, narratives or pictorial presentations to signify the importance of health and nutrition.

Implications for Curriculum Development

With these results in mind, the study suggests the following changes:

- Expand the curriculum to include micronutrient deficiencies, sustainable food practices, and region-specific nutrition challenges. [14,15]
- Integrate nutrition education more comprehensively into other subjects to promote consistency and repetition of the key concepts.
- Use practical learning strategies such as interactive activities, meal-planning exercises, and school-based nutrition programs.
- Contextualize content: use local food sources, dietary habits, and public health concerns relevant to KP's population in the curriculum.
- Incorporate nutrition-related contents in Mathematics, Science, Urdu, and Social Studies in a logical way relevant to the nature of these subjects. So for example, include nutrition-related contents in Urdu book in a way to reflect the contents in all domains of Urdu course e.g. lessons, stories, narratives, diary writing, exercise, Grammer and composition etc. in the same way, incorporate nutrition-related contents in the mathematics courses for calculation that relate to nutrition (e.g. Body mass index formula BMI, height measurement, weight measurement etc). Some possible examples are provided in Annexure-I.
- The pictorial presentation should be reflected in all curricula of the primary education. There are many ways to include it. Some examples are provided in Annexure-II.

This study shows serious gaps in how nutrition education in primary school textbooks is addressed in KP. It can be concluded that the reasons for not delivering effective nutrition education may include a lack of depth, lack of practical and cultural relevance, and thus a lack of shaping students' health behaviors. Improvement in nutrition

literacy through curriculum changes, teacher training, and interdisciplinary approaches can play a crucial role in improving the health outcomes of children in Pakistan. Recommendations for Improving Nutrition Education in Primary Schools The following recommendations are proposed to enhance nutrition education in primary schools:

- Comprehensive Review of Curriculum: Textbooks should be updated to include a greater spread of nutrition-related topics that conform to dietary guides.[16]
- Horizontal Integration: Nutrition concepts must be covered integrally in Science, Mathematics (for calculation), Social Studies, and Urdu lessons.
- Alternative Learning Techniques: Hands-on activities, illustrations, and real-life examples can enhance student interest in the topic.
- Teacher Training: Educators should have access to the resources necessary to teach nutrition concepts convincingly.
- There should be pictures in books (some examples in Annexure-II) and outside the books (some examples in Annexure-III) as part of the curriculum.

Limitations

This study was limited to the content present in textbooks and did not evaluate teacher delivery methods, classroom discussions, or students' comprehension of the material. Additionally, it did not assess the effectiveness of nutrition education in influencing actual dietary behaviors among students. Future research could incorporate teacher interviews, student surveys, and classroom observations to provide a more comprehensive evaluation of nutrition education in KP primary schools.

Conclusion

This study emphasizes the need for a better approach towards nutrition education in the primary school curriculum of KP. Addressing the identified gaps can contribute to better awareness among young students, ultimately fostering healthier dietary habits and reducing malnutrition risks in Pakistan. References A list of relevant academic studies, curriculum guidelines, and government reports consulted for this research. Keywords: Nutrition education, primary school curriculum, textbook analysis, Khyber Pakhtunkhwa, dietary guidelines, malnutrition prevention.

Declaration

There is no conflict of Interest/Competing Interests among authors.

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Annexure-I

Integrate Nutrition in Mathematics

Integrating nutrition into mathematics can help the students develop mathematical skills as well as un-derstandthehealthywayofeating.Someofthebestwaystocombinethesesubjectsareasfollows:

1. MeasurementandQuantities:Teachthestudentstomeasurefoodportionsingrams,milliliters, andki-lograms.Example:Ifanappleweighs150grams,howmuchwill4applesweigh?

2. CalorieCalculationsStudentswillbeabletocalculatehowmanycaloriestheytakeinfromdiff erent foods.Example:Ifachocolatebarcontains250caloriesandanapplehas80calories,whichi sthe healthier choice? How many apples equal the calories of one chocolatebar?

3. RatiosandProportions:Comparethenutrientcompositionofdifferentfoodsusingratios.Exa mple: Supposeamealcontains50%carbohydrates,30%proteins,and20% fats.Whatproportiondoes it account for in a 2,000-caloriediet?

4. PercentagesinNutrition:Studentscanreadlabelsofnutritiontodeterminepercentagevalues. Exam-ple:Adailydietconsumes2,000calories,andachocolatebarcontains400calories.What percentage does it account for the total calorie intake for aday?

5. StatisticsandDataAnalysis:Askstudentstocollectdataaboutfoodchoicesandplotgraph sand charts.Activity:Askthestudentstodocumentthedailyintakeoftheirclassmatesandcalculat ethe mean calorie consumption perday.

6. Cost and Budgeting: Teach the students to plan a healthy meal budget based on the cost com-parisonofnutritiousversusunhealthyfood.Activity:Ifastudenthas10Rupeestospendon snacks, what is the best choice he can make within that budget? In addition, if nutrition is integrated into mathematics, students would understand healthy eating habits while improving theirmathskills. Thiswouldhelpimprovetheiracademicsandpreparethemforreal-lifedecision- making on food and-health.

Integrating Nutrition into Social Sciences

IncludingnutritionwithintheSocialSciencesallowsstudentstoappreciatetheimpactoffoodwithinsociety, culture,economics,andpublichealth.Hereishownutritioncouldbeincludedintodifferentbranchesof social-sciences.

1. FoodHistoryandCulturalPerspectiveExplorehowdifferentcultureshavedevelopedsystemsof foodaswellaswaysofagriculturepractices.Discussdifferenttraditionaldietsbydifferentcultures aswellaswhatglobalizationhascontributedtothealterationsofeatingstyles.tExample:Howdid the Green Revolution affect food production andnutrition?

2. Geography and Food Distribution Investigate how climate, soil, and geography influence what foodsareproducedinvariousareas.Analyzefooddesertsandavailabilityofhealthyfoodincities andcountryside.Example:Whydotropicalregionsproducemorefruits,whilecolderregionsrely on preservedfoods?

3. EconomicsofNutritionandFoodSystems.Costofhealthfoodversusnon-healthfoodforvarious incomeclasses.Effectoffoodpolicies,subsidies,onnutritionchoiceExample:Comparingfast foodswithfreshfruitsandvegetables;howpricingcouldinfluenceconsumerdecision.

4. SociologyandFoodBehavior:Analyzingfamilyinfluence,mediapressure,andfriendinfluenceon dietaryhabits.Examiningsocialnetworkandadvertisinginfoodchoices.Example:Howdocultural traditions shape eating habits in differentsocieties?

5. Political Science and Food Policies Talk about government policies on food safety, nutrition labeling,andschoolmealprograms.Discussinternationalorganizations(e.g.,WHO,FAO)andtheir workonmalnutrition.Example:Howdogovernmentpolicieshelpcombatmalnutritionandobesity?

6. PsychologyandEatingHabits:Discusstheimpactofmentalhealthandemotionsonfoodselection. Describeeatingdisordersandtheroleofnutritioninmentalwell-being.Example:Whydopeople get a craving for junk food when they are understress?

By adding nutrition to the Social Sciences curricula, one can learn comprehensively how different food choices would affect society, economy, and health. Such an approach nurtures critical thinking and promotes a healthier lifestyle as part of broader social contexts.

Integrating Nutrition in Urdu Courses

Nutrition can be integrated into Urdu courses to improve the language skills of students while creating awarenessabouthealthyeatinghabits.Thiscanbeachievedthroughreading,writing,poetry,storytelling, and discussions. Here's how nutrition can be incorporated into Urdu languagelearning:

1. ReadingComprehension(مطالعہ)Stories,articles,andessaysonhealthyeatinghabits,balanceddiets, andtheimportanceofnutritioncanbeincluded.Havethestudentsreadanarticleonbenefitsof fruits and vegetables and read comprehensionquestions.
2. EssayandParagraphWriting(مضمون نویسی)Assignessaytopicsaboutnutritionwith anaimthatstudentswilllookupandapplytheircriticalthinkingskills.Essaytopics\"میرا پسندیدہ پھل\"(MyFavoriteFruit)"متوازن خوراک کا ہماری زندگی میں اہم کردار\"(TheImportanceofaBalancedDiet)"جنک فوڈ کے نقصانات\"(HarmsofJunkFood)"دودھ اور دہی کے غذائی فوائد\"(NutritionalImportanceofMilkandYogurt)
3. PoetryandRhymes(شاعری اور نظم)Askstudentstowriteorreadsimplepoemsabouthealthyfood andexercise. Example:"سبزیاں کھاؤ، طاقت پاؤ!"(Eat vegetables, gainstrength!)"دودھ پیو، صحت جیو!"(Drinkmilk,stayhealthy!)
4. Storytelling(کہانی سنیں)Askstudentstowriteshortstorieswherethemaincharacterlearnsalesson abouteatinghealthy.Example:Astoryaboutaboywhoeatstoomuchjunkfoodandfallssickbut recovers after switching to healthymeals.
5. مکالمہ نویسی Studentscanwriteandperformdialoguesabouthealthyfoodchoices.Example:A conversationbetweentwofriends—onewhoeatsjunkfoodandtheotherwhoeatsabalanceddiet, discussing the effects of their eatinghabits.
6. کہاوتیں اور محاورے Teachstudentsproverbsandsayingsaboutfoodandhealth.Example:"آپ وہ ہیں جو آپ کھاتے ہیں۔"(Youarewhatyoueat.)"تندرستی ہزار نعمت ہے۔"(Healthisagreatblessing.)7.Public SpeakingandDebates(عوامی خطاب اور مباحثہ)Holddebatesandspeechesonnutrition-relatedtopicsto improvespeakingskills.Exampletopics:"کیا گھر کا کھانا فاسٹ فوڈ سے بہتر ہے؟"(Ishomemadefoodbetterthan fastfood?)"جنک فوڈ ہماری صحت کے لئے نقصان دہ ہے۔"(Junkfoodareharmfultoourhealth.)

Withincorporationofnutritionintourducourses,thestudentwilldevelopitsreading,writing,andspeaking skills,andatthesametimeacquirevaluableknowledgeabouthealthyeatinghabits.Inthismanner,learning becomesmoreinterestingandstudentscanlearnhowtoapplytheirlanguageskillstoreal-life.

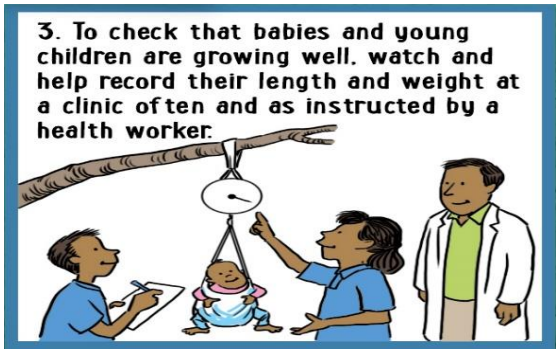
Integrating nutrition into science

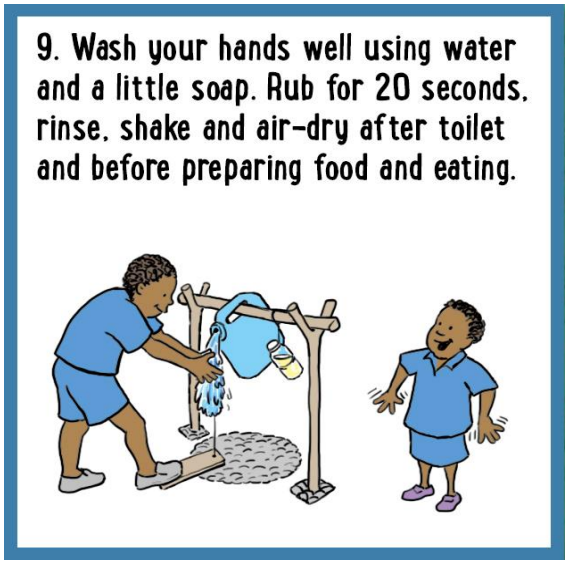
Integrating nutrition into science books may be an effective way to help students develop healthy eating habits and scientific literacy. Here are a few ways this can be achieved:

1. Nutrition Topics in Science Curricula: Human Body and Nutrition: Explain how nutrients affect different body systems, such as digestive, circulatory, and nervous systems. Food Groups and Balanced Diet: Let the students learn about macronutrients like carbohydrates, proteins, and fats and micronutrients like vitamins and minerals. Digestion and Metabolism: The way the human body processes the food to obtain energy. Nutritional Deficiencies and Diseases: Malnutrition, obesity, and vitamin or mineral deficiencies
   Healthy vs. Unhealthy Foods: Explain the difference between natural, processed, and junk foods.
2. Practical Activities: Food Label Analysis: Train the students on reading and understanding the food label. Healthy Meal Planning: Require students to make a balanced diet based on the guidelines of nutritional information. Lab experiments on food constituents: Have the students do simple lab experiments like testing for starch in food by using iodine.
3. Nutrition as Environmental Science: Sustainable Food Choices: Explain how food decisions affect the environment. Agriculture and Climate Change: Discuss how agriculture and food waste impact the environment. Local and Seasonal Foods: Have students research regionally available foods.
4. Use Visual and Interactive Resources: Diagrams and Charts: Use food pyramids, diagrams of the digestive system, and nutrient cycles. Storytelling and Case Studies: Stories of children from various cultures may be used in discussion of diets. Technology Integration: The use of apps or online tools in tracking food intake and the analysis of diets.

Annexure-II

Pictorial Representation – Some Examples






Nutrition Facts
6 servings per container
Serving size 1 cup (230g)
Calories 245
Total Fat 12g 14%
Saturated Fat 2g 10%
Trans Fat 0g
Cholesterol 8mg 3%
Sodium 210mg 9%
Total Carbohydrate 34g 12%
Dietary Fiber 7g 25%
Total Sugars 5g
Includes 4g Added Sugars 8%
Protein 11g
Vitamin D 4mcg 20%
Calcium 210mg 16%
Iron 3mg 15%
Potassium 380mg 8%
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Dietary Fiber 7g 25% 14g 50%
Total Sugars 5g 10g
Incl. Added Sugars 4g 8% 8g 16%
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Vitamin D 4mcg 20% 8mcg 40%
Calcium 210mg 16% 420mg 32%
Iron 3mg 15% 6mg 30%
Potassium 380mg 8% 760mg 16%
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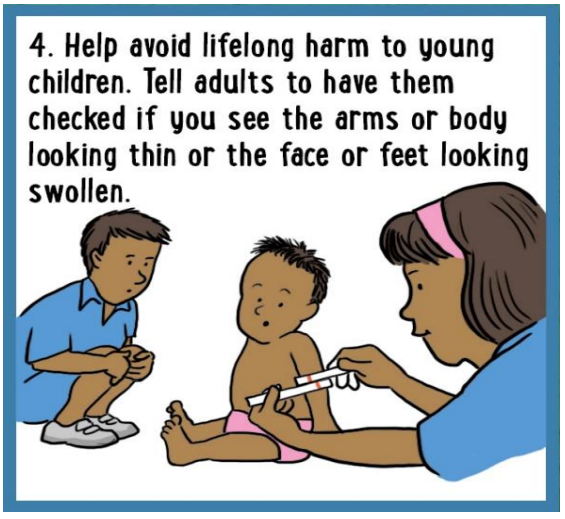
Total Sugars 5g
Includes 4g Added Sugars 8%
Protein 11g
Vitamin D 4mcg 20 · Calcium 210mg 16% · Iron 3mg 15% · Potassium 380mg 8%
Thiamin 13% · Riboflavin 9% · Niacin 12%


10. Wash fresh food well as you prepare it. Use cooked food immediately or make sure it's stored away from flies to make it safe to eat later.


Healthy recipes

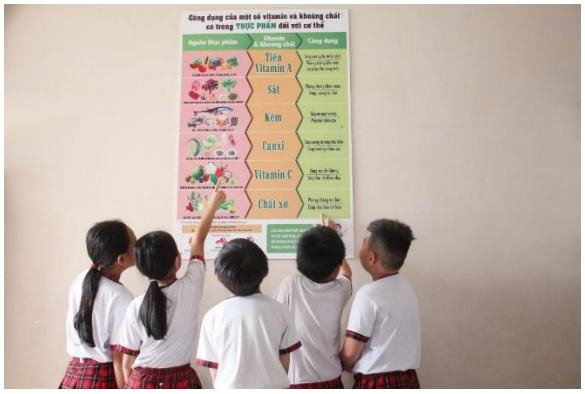

Lunch N' Learn Workshop
Nutrition For Kids


Nutrition 10 messages for children to learn and share
ARM
GO
GROW
GLOW


4. Help avoid lifelong harm to young children. Tell adults to have them checked if you see the arms or body looking thin or the face or feet looking swollen.

Annexure-III

Examples of pictures that can be used outside the class-roomss as a source of nutrition education


Công dụng của một số vitamin và khoáng chất có trong THỰC PHẨM đối với cơ thể
Nguồn thực phẩm
Vitamin và khoáng chất
Công dụng
Tiên Vitamin A
Sắt
Kẽm
Canxi
Vitamin C
Chất xơ