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Evaluation of Poor Eating Habits among Children Aged 3-16 Years in Schools

Ahmad Ibne Yousaf[1], Zartasha Gull[2], Qaswara Affaf[3], Sameen Tahir[4], Kashif Khattak[5], Azzah Khadim Hussain[2]

[1]School of Human Nutrition & Dietetics / Academic Officer, Minhaj University, Lahore, Punjab, Pakistan
[2]School of Human Nutrition & Dietetics, Minhaj University, Lahore, Punjab, Pakistan
[3]Department of Public Health, University of Otago, New Zealand
[4]Department of Food Science & Human Nutrition, Kinnaird College for Women University, Lahore, Punjab, Pakistan
[5]District Coordinator UN-WFP BNP, DoH, KP, Pakistan

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Corresponding Author: Ahmad Ibne Yousaf,
School of Human Nutrition & Dietetics / Academic Officer, Minhaj University, Lahore, Punjab, Pakistan.
Email: ahmadyousaf.cs@mul.edu.pk, https://orcid.org/my-orcid?orcid=0009-0008-1801-794X

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ABSTRACT

In recent years, medical science has achieved significant advancements, yet nutrition remains a critical field with immense potential. Nutrition science, once underappreciated, gained recognition after global studies highlighted its vital role in combating health challenges. Today, with non-communicable diseases (NCDs) surpassing communicable diseases in prevalence, nutrition-based interventions are crucial. The global response includes initiatives by organizations like WHO, FAO, and UNICEF, which invest billions in programs such as food fortification and nutrition education. According to 2020 Joint Child Malnutrition Estimates, 149.2 million children under five were stunted, 45.4 million wasted, and 38.9 million overweight. COVID-19 exacerbated nutrition challenges, especially in South Asia, where awareness is limited. The pandemic underscored the link between nutrition and immunity, prompting renewed focus on dietary interventions. In Pakistan, malnutrition, stunting, and anemia remain prevalent. Our study examines the factors driving poor nutrition, focusing on the eating habits of children aged 3–16 in Peer-Mahil, District Toba Tek Singh, Punjab. Collaborating with NutriBites, we surveyed 500 children (255 boys, 245 girls) using anthropometric measurements, clinical assessments, questionnaires, and discussions. Data was analyzed via SPSS, revealing significant trends in dietary behaviors and nutritional deficiencies. This report highlights the urgent need for multidimensional public nutrition policies to address these issues and improve child health outcomes in Pakistan.

INTRODUCTION

Adequate nutrition is essential for the growth and development of every human being, unfortunately a large proportion of our population has been affected by major issue, which is termed as: "Poor Eating Habits" PEH is a diverse medical condition which refers to a person's poor choice to its consumption of food which ultimately impacts his/her nutritional, immunological and psychological growth and development (Danao et al., 2024). The population which is impacted by the consequences of PEH is children as they are more addicted to junk and processed food in comparison to elder population (Begum et al., 2024). The etiology of PEH includes: Attractive advertisement, taste enhancers, lack of parental control and interest and etc (Chacko et al.,m 2024).

However, the consequences are severe, such as: stunted growth, wasting, malnutrition, Protein Energy Malnutrition and other nutrition related disorders (Amoadu et al., 2024). According to our research in District Toba Tek Singh, 36.6 % of children were suffering from different Micronutrient deficiencies, 15.2 were obese, 44.2 % were underweight and 11.8 % children were stunted. This data has been interpreted from a population analysis of 500 participants, and is further classified according to their gender and age group. This research aims to evaluate poor eating habits in children aged 3–16, assess the prevalence of stunting, wasting, malnutrition, and micronutrient deficiencies, and analyze the data for educational purposes. Furthermore, innovative biomedical advancements, such as the green synthesis of Agaricus avensis-mediated silver nanoparticles, demonstrate potential in addressing nutritional challenges by enhancing catalytic processes like those of tyrosine hydroxylase, which may have significant implications for improving nutritional outcomes (Ali et al., 2024).

The findings will support the development of a multidimensional public nutrition policy to address these issues. The study is significant as it helps stakeholders identify the root causes of poor nutrition in the targeted population, encourages healthier eating practices, and provides academic insights into the nutritional challenges of the region, contributing to improved public health strategies.

Figure 1

Elaborates how can a public nutrition program devised

METHODOLOGY

The target group for this survey is divided into three groups, Primary, Secondary, and Tertiary. The primary group includes children who were assessed by anthropometric measurements, clinical diagnosis and Food Frequency Questionnaire. The secondary group comprised parents and teachers, who filled a questionnaire regarding their children's eating habits and teachers discussed the lunch eating habits of children. Tertiary group included the school administration, which elaborated the veracity of the situation, it included: the sports teacher, canteen officer, vice principal and school administrator.

The data obtained from the, primary, secondary and tertiary group provided us a detailed insight on the poor eating habits of children. The Food Frequency Questionnaire allowed us to evaluate the food preferences of the certain group, through which we provided a nutritionally adequate intervention. The intervention for the addressed population was conducted in two phases. This is discussed in the intervention section of this report.

Figure 2

A triangle diagram illustrating the three target groups in an educational context: Primary (Children) at the top, Secondary (Parents & Teachers) on the left, and Tertiary (School Administration) on the right, with the central focus on "Target Groups."

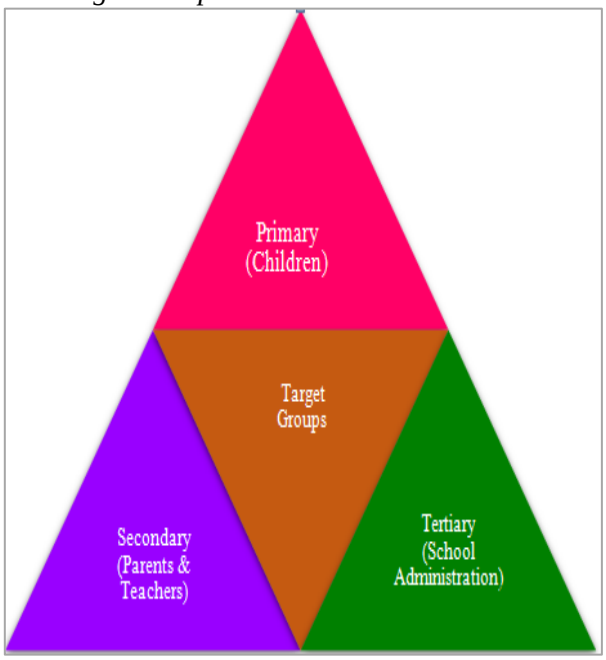
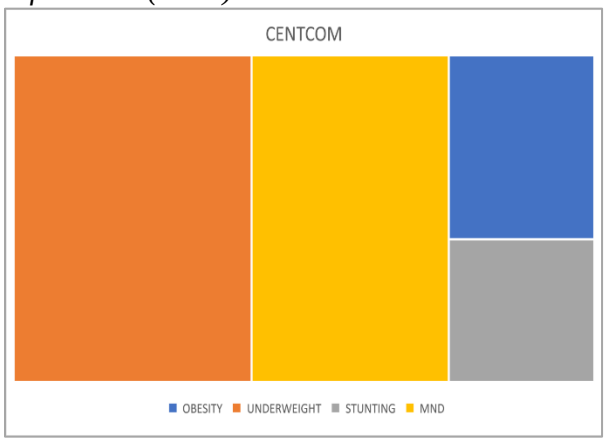


Figure 3

Tree-map representation of nutritional and health conditions in CENTCOM, the prevalence of obesity, underweight, stunting, and micronutrient deficiencies (MND).



The tree-map provides a comparative visual representation of key nutritional issues within the CENTCOM region. The largest segment represents underweight individuals, indicating it as a significant concern, followed by stunting, reflecting chronic malnutrition. Micronutrient deficiencies (MND) and obesity are smaller yet noteworthy categories, showing the coexistence of under nutrition and over nutrition. This dual burden of malnutrition underscores the need for targeted public health interventions addressing diverse nutritional challenges in the population.

Table 1

Tree-map of obesity, underweight, stunting, and micronutrient deficiencies (MND) prevalence in the CENTCOM region, gender-specific distributions.

Interpretation CENTCOM				
Total: 500	Obesity	Underweight	Stunting	MND
Boys: 255	34	131	33	76
Girls: 245	42	90	26	107
Total	76	221	59	183
Percentage	15.20%	44.20%	11.80%	36.60%
CENTCOM elaborates the key findings of this report; it interprets the individualized ratio of each disease in each gender. MND (Micronutrient Deficiency is calculated in overall population and is not related to Obesity, Underweight and Stunting)				

Figure 4

Ray-I elaborates the comparison of four medical conditions which were diagnosed in the survey, MND (Micronutrient Deficiencies), Stunting, Obesity, and Underweight. This is then specified to each gender and whole population.

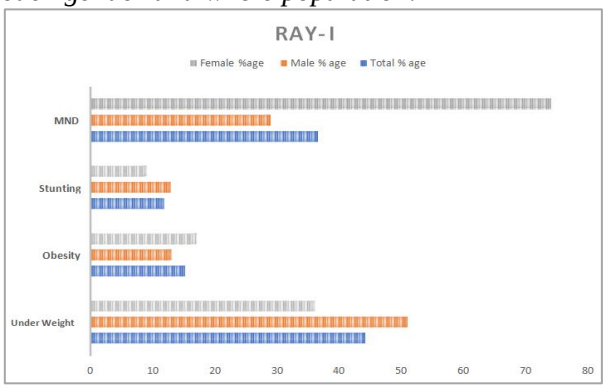


Table 2

Prevalence of underweight, obesity, stunting, and micro-nutrient deficiencies (MND) in the RAY-I region, highlighting gender-specific and total population distributions.

Interpretation RAY-I					
Total Population	500	Underweight	Obese	Stunted	MND
Male	255	131	34	33	76
Female	245	90	42	26	107
Total Affected	356	221	76	59	183
Percentage	71%	44.20%	15.20%	11.80%	36.60%
The average percentage does not include MND, as it is prevalent in overall population					

Underweight Boys

Figure 5

CUBEX-I: Elaborates the percentage of underweight boys from 3-16 years of age

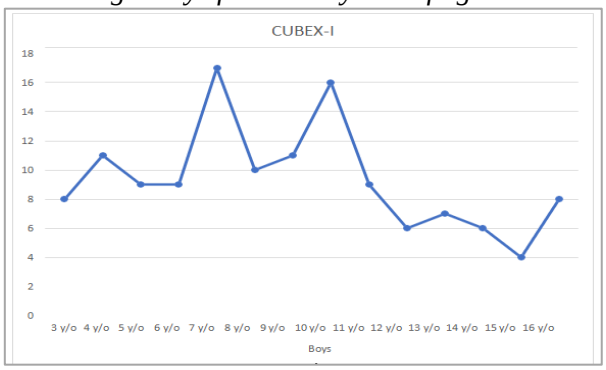


Table 3

Age-wise distribution of underweight boys in the CUBEX-I region, with 51% of 255 boys screened identified as underweight based on height and age criteria.

Interpretation CUBEX-I													
3 y/o	**4 y/o**	**5 y/o**	**6 y/o**	**7 y/o**	**8 y/o**	**9 y/o**	**10 y/o**	**11 y/o**	**12 y/o**	**13 y/o**	**14 y/o**	**15 y/o**	**16 y/o**
8	11	9	8	19	10	11	15	9	6	7	6	4	8
Total: Out of 255 boys screened, 131 boys were underweighted.													
Percentage: 51% of boys were underweight in accordance to their height and age.													

Figure 6

Obesity: FULCRUM-I: Elaborates the no: of obese boys from 3-16 years of age

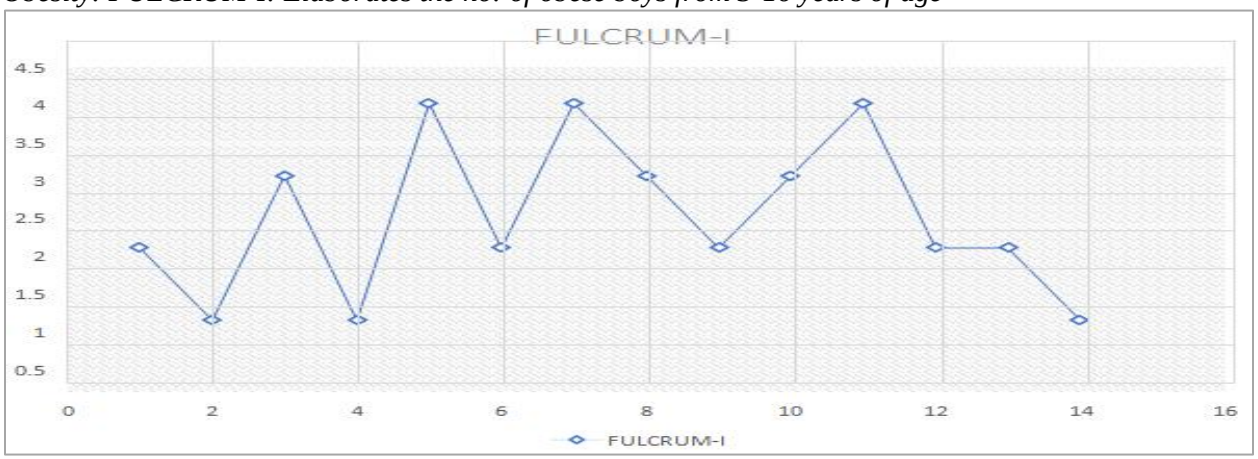


Table 4

Age-wise distribution of obese boys in the FULCRUM-I region, with 13% of 255 boys screened classified as obese based on height and age criteria.

Interpretation FULCRUM-I													
3 y/o	**4 y/o**	**5 y/o**	**6 y/o**	**7 y/o**	**8 y/o**	**9 y/o**	**10 y/o**	**11 y/o**	**12 y/o**	**13 y/o**	**14 y/o**	**15 y/o**	**16 y/o**
2	1	3	1	4	2	4	3	2	3	4	2	2	1
Total: Out of 255 boys screened, 34 boys were obese.													
Percentage: 13% of boys were obese in accordance to their height and age.													

Stunting

Figure 7

ASTRIX-I: Elaborates the no: of stunted boys from 3-16 years of age.

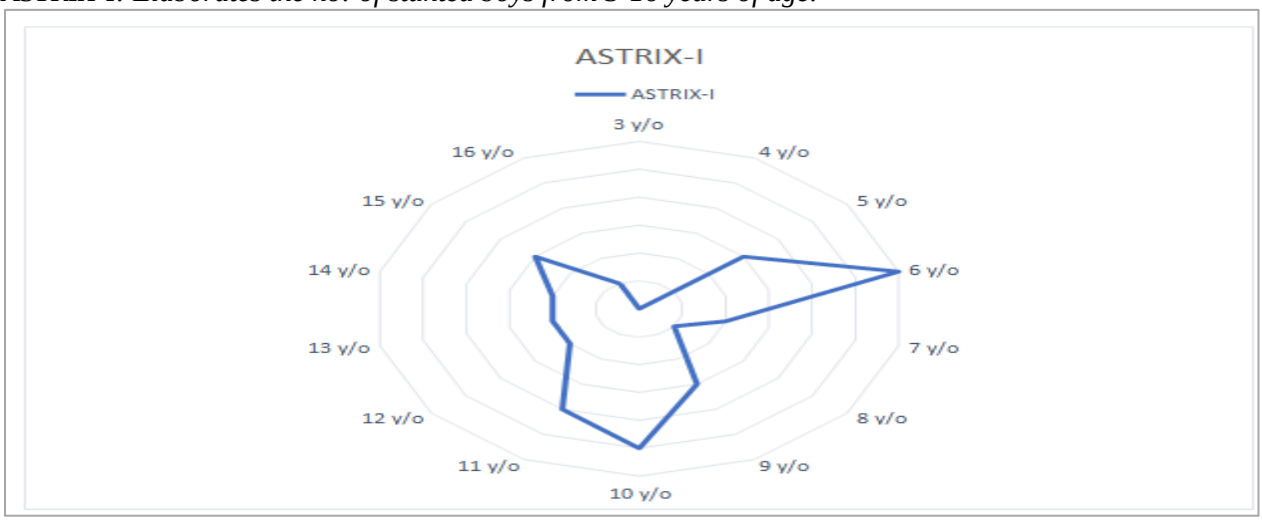


Table 5

Age-wise distribution of stunted boys in the ASTRIX-I region, with 12.9% of 255 boys screened identified as stunted based on age and weight criteria.

Interpretation ASTRIX-I													
3 y/o	**4 y/o**	**5 y/o**	**6 y/o**	**7 y/o**	**8 y/o**	**9 y/o**	**10 y/o**	**11 y/o**	**12 y/o**	**13 y/o**	**14 y/o**	**15 y/o**	**16 y/o**
0	0	3	6	2	1	3	5	4	2	2	2	3	1
Total: Out of 255 boys screened, 33 boys were obese.													
Percentage: 12.9% of boys were stunted in accordance to their age and weight													

Micronutrient Deficiency

Figure 8

GLASGOW-I: Elaborates the no: of MND boys from 3-16 years of age

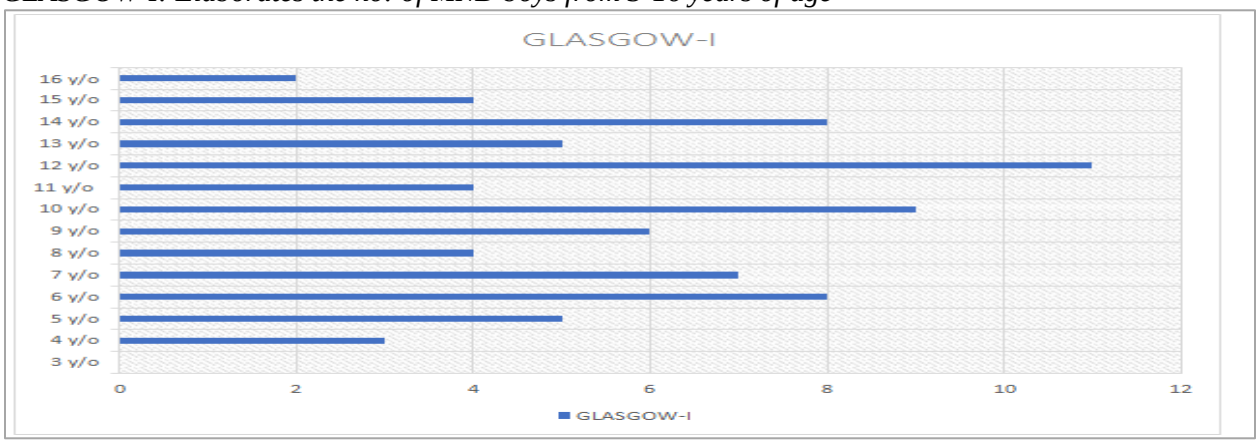


Table 6

Age-wise distribution of boys with micronutrient deficiencies in the GLASGOW-I region, with 29% of 255 boys screened identified as micronutrient deficient.

Interpretation GLASGOW-I													
3 y/o	**4 y/o**	**5 y/o**	**6 y/o**	**7 y/o**	**8 y/o**	**9 y/o**	**10 y/o**	**11 y/o**	**12 y/o**	**13 y/o**	**14 y/o**	**15 y/o**	**16 y/o**
0	3	5	8	7	4	6	9	4	11	5	8	4	2
Total: Out of 255 boys screened, 76 boys were Micronutrient Deficient													
Percentage: 29% of boys were Micronutrient Deficient													

Underweight Girls

Figure 9

CUBEX-II: Elaborates the percentage of underweight girls from 3-16 years of age

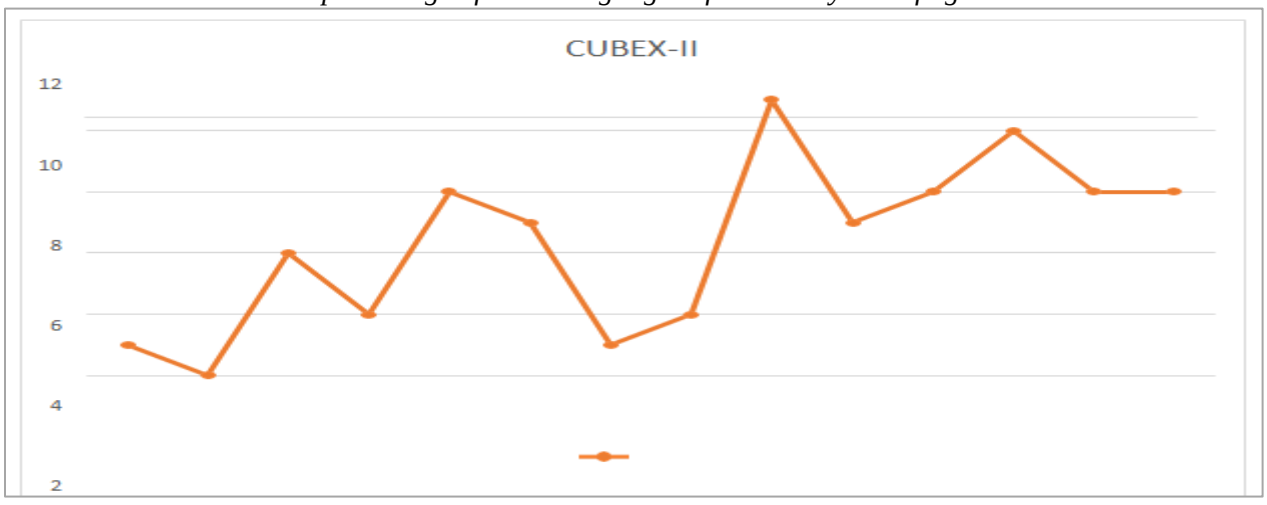


Table 7

Age-wise distribution of underweight girls in the CUBEX-II region, with 36% of 245 girls screened classified as underweight based on height and age criteria.

Interpretation CUBEX-II													
3 y/o	**4 y/o**	**5 y/o**	**6 y/o**	**7 y/o**	**8 y/o**	**9 y/o**	**10 y/o**	**11 y/o**	**12 y/o**	**13 y/o**	**14 y/o**	**15 y/o**	**16 y/o**
3	2	6	4	8	7	3	4	11	7	8	10	8	9
Total: Out of 245 girls screened, 90 girls were underweighted.													
Percentage: 36% of girls were underweight in accordance to their height and age.													

Obesity

Figure 10

FULCRUM-II: Elaborates the no: of obese girls from 3-16 years of age

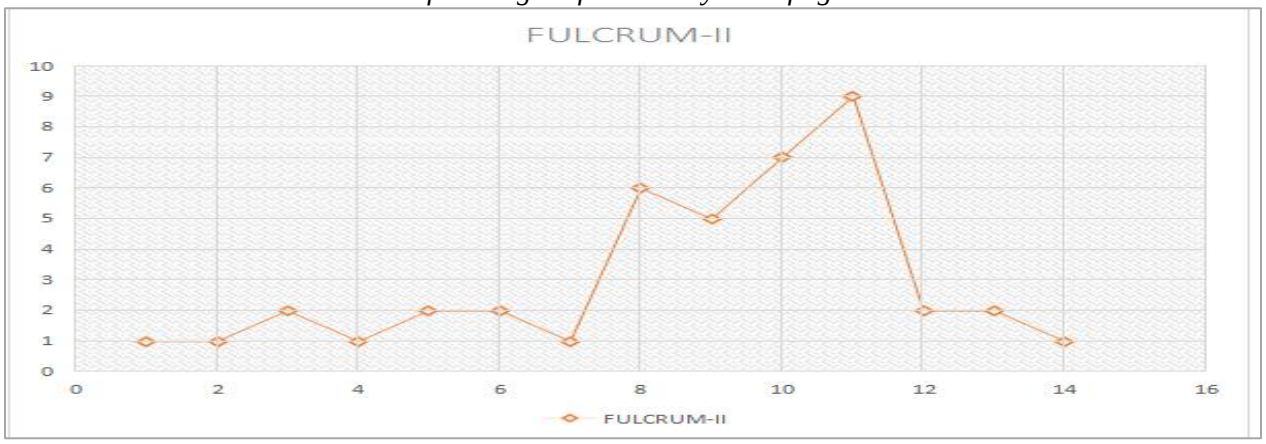


Table 8

Age-wise distribution of obese girls in the FULCRUM-II region, with 17% of 245 girls screened classified as obese based on height and age criteria.

Interpretation FULCRUM-II													
3 y/o	**4 y/o**	**5 y/o**	**6 y/o**	**7 y/o**	**8 y/o**	**9 y/o**	**10 y/o**	**11 y/o**	**12 y/o**	**13 y/o**	**14 y/o**	**15 y/o**	**16 y/o**
2	1	3	1	4	2	4	3	2	3	4	2	2	1
Total: Out of 245 girls screened, 42 girls were obese.													
Percentage: 17% of girls were obese in accordance to their height and age.													

Stunting

Figure 11

ASTRIX-II: Elaborates the no: of stunted girls from 3-16 years of age.

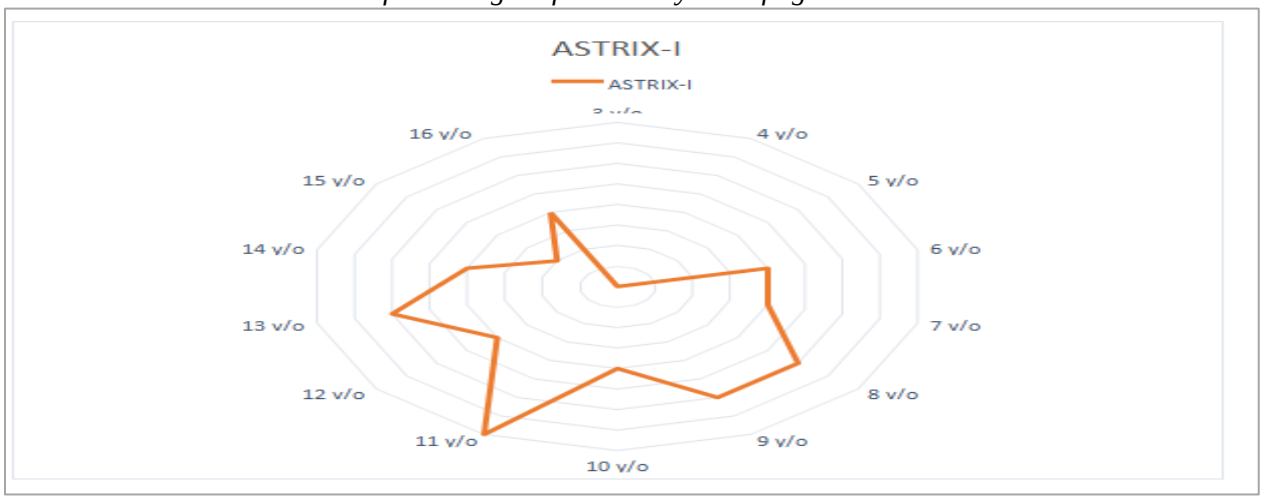


Table 9

Age-wise distribution of stunted girls in the ASTRIX-II region, with 9% of 245 girls screened identified as stunted based on age and weight criteria.

Interpretation ASTRIX-II													
3 y/o	4 y/o	5 y/o	6 y/o	7 y/o	8 y/o	9 y/o	10 y/o	11 y/o	12 y/o	13 y/o	14 y/o	15 y/o	16 y/o
0	0	0	2	2	3	3	2	4	2	3	2	1	2
Total: Out of 245 girls screened, 24 girls were obese.													
Percentage: 9% of girls were stunted in accordance to their age and weight													

Micronutrient Deficiency

Figure 12

GLASGOW-II: Elaborates the no: of MND girls from 3-16 years of age

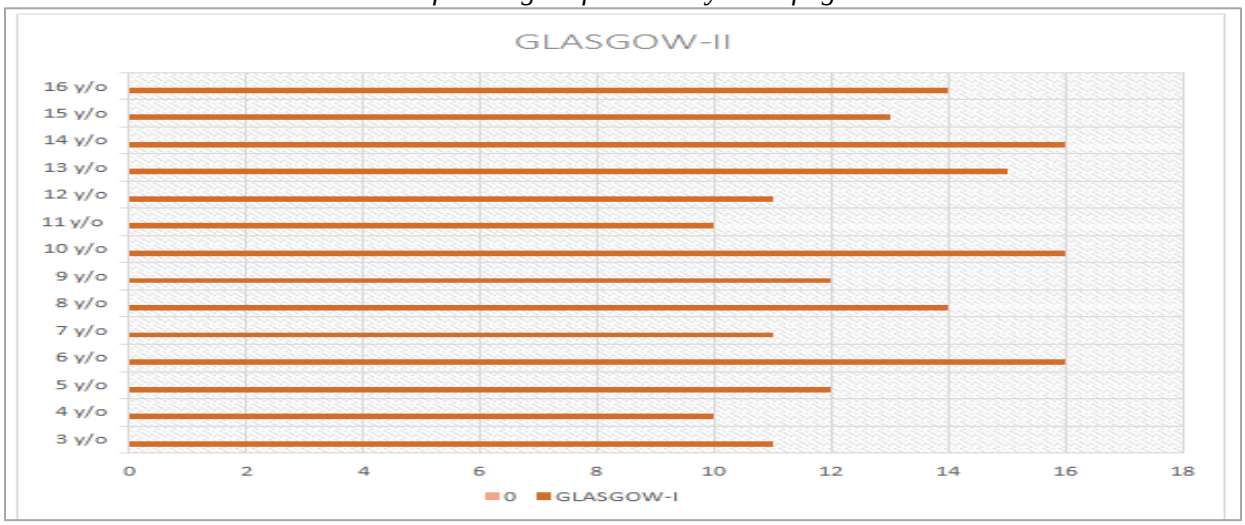


Table 10

Age-wise distribution of girls with micronutrient deficiencies in the GLASGOW-II region, with 74% of 255 girls screened identified as micronutrient deficient.

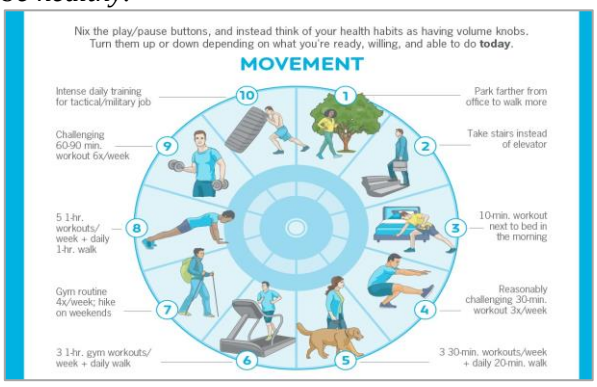
Interpretation GLASGOW-II													
3 y/o	4 y/o	5 y/o	6 y/o	7 y/o	8 y/o	9 y/o	10 y/o	11 y/o	12 y/o	13 y/o	14 y/o	15 y/o	16 y/o
11	10	14	16	11	14	12	16	10	11	15	16	13	14
Total: Out of 255 girls screened, 183 girls were Micronutrient Deficient													
Percentage: 74% of girls were Micronutrient Deficient													

Etiology

The nutrition research program was designed to evaluate poor eating habits in children aged 3–16 years. The findings revealed a prevalence of micronutrient deficiencies (MND) and obesity in girls, while stunting and underweight conditions were more common in boys. The primary causes identified include poor eating habits, frequent consumption of processed and junk foods, soft drinks, and high-sugar foods, alongside a lower intake of fruits and vegetables. Additionally, factors such as lack of parental control over dietary choices, insufficient physical activity, and excessive screen time contributed to the problem.

Figure 12

Types of physical activities children can employ to be healthy.



Children in District Toba Tek Singh exhibited selective food preferences, often favoring processed and junk foods, which negatively impacted their nutritional status. Many consumed such foods more than four times a week, driven by their easy availability and appealing taste (McBey et al., 2024). Obese children were found to have at least two servings of high-sugar foods and 2–3 servings of soft drinks daily (Khan et a., 2024). Conversely, the consumption of fruits and vegetables was notably low, partly due to an addiction to broiler chicken (Golowczyc et al., 2024). Parental intervention in promoting dietary diversity was minimal, and in some cases, children influenced the dietary preferences of their households (Roba et al., 2024).

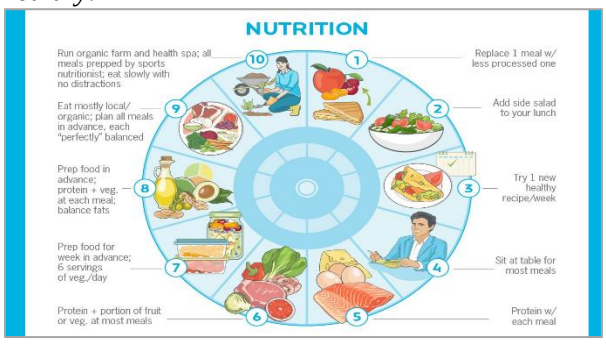
Moreover, the lack of physical activity, compounded by an average screen time of 5–6 hours, further exacerbated unhealthy eating behaviors. Food availability was another concern, with many families lacking access to nutritious food due to financial constraints or food adulteration by local suppliers (Kuboka et al., 2024). These findings underscore the need for targeted interventions to improve dietary habits and nutritional outcomes in this population (Amson et al., 2024).

Nutrition Intervention

After diagnosing the etiology of the medical conditions, our nutritional intervention was categorized in two phases, PHASE-I and II. Each intervention was carefully planned and was clinically approved by (Team NutriBites) to combat the nutritional concerns of the addressed population. In addition to this, activities were devised and executed in to ensure the understanding of interventions.

Figure 13

The nutrition steps which can be employed to be healthy.



Phase-I

Individualized consultation to the eating concerns was addressed by providing parents with replacement for currently consumed food. Children were screened for nutritional deficiencies and later on children and parents were provided with one-on-one consultation sessions. In this regard the primary population was further classified in four groups:

I. Group Alpha-A: Boys 3-7 years of age
II. Group Alpha-B Girls 3-7 years of age
III. Group Beta-A Boys 8-16 years of age
IV. Group Beta-B Girls 8-16 years of age

This classification was done on the basis of age group and gender. The intervention of Phase-I mainly included: dietary diversity, peer influence, placebo effect and modification of food appearances, Such as: Recommending Chocolate Cow Clostrum Shake for Protein Energy Malnutrition.

Phase-II

Community session with addressed population, which included all the target groups but special focus was laid on secondary and tertiary group. This phase focused on *"EMPOWERING GENERATIONS THROUGH NUTRITIONAL FUEL"*, the main objective was to promote physical activity, adequate nutrition, and proper sleep time, social engagement, minimizing stress and developing a healthy environment, which in turn will minimize unhealthy eating practices and ensure access to adequate nutrition. The intervention of Phase- II was to educate the stakeholders and addressed population to focus on improving dietary diversity, ensuring parental control in dietary choices, food availability and providing adequate micronutrients through fruits and vegetables consumption. Some of the information graphics shared with target population.

CONCLUSION

Adequate nutrition is among the basic human rights and must be ensured by all the stake holders as well as the population groups. Unfortunately, majority of the population in Pakistan lies under the line of poverty, which places barriers in providing adequate nutrition. Covid-19 pandemic has further escalated the situation and with new emerging Omicron variant, a large group of population is

under threat. Most vulnerable are children. Recently we conducted a study in the area of Peer Mahil, District Toba Tek Singh, in which approximately 500 children were screened for malnutrition, stunted growth and micronutrient deficiencies, total population contained 255 boys and 245 girls. The purpose of the study was to collect nutrition data, which could be studied and interpreted in this report as well as to ensure nutrition education and awareness in rural communities. In this regard we collaborated with a nutrition firm "NutriBites" which provided us with all the logistical services. In this report we have interpreted the data obtained in Peer Mahil, through graphs, CENTCOM, RAY-I, CUBEX-I and II, FULCRUM I and II, ASTRIX I and II and GLASGOW I and II, according to our research in District Toba Tek Singh, 36.6 % of children were suffering from different Micronutrient deficiencies, 15.2 were obese, 44.2 % were underweight and 11.8 % children were stunted. The data is further used to devise a multidimensional public nutrition policy which can be implemented to ensure adequate nutritional status in the designated population.

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