

Research Paper



Nutritional status of children attending basic schools providing mid-day meal a comparative study

Aruna Gyawali\*

\*PhD Scholar, Central Department of Home Science, Tribhuvan University, Nepal.

| Article Info                                                                                                                                                                                                                                                                                          | ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Article History:</b><br/>Received: 05 August 2024<br/>Revised: 10 October 2024<br/>Accepted: 19 October 2024<br/>Published: 02 December 2024</p> <p><b>Keywords:</b><br/>MDM<br/>Basic Schools<br/>Malnutrition<br/>Dietary Habit<br/>Nutritional Status<br/>Parents' Education</p> <div></div> | <p><b>Objective:</b> This study aims to evaluate the nutritional status of schoolchildren attending basic schools (from pre-primary up to grade 8) in rural and urban municipalities of Nepal. Also, it compares nutrition status between children who do get school-provided midday meals (MDM) and those who do not.</p> <p><b>Design:</b> Cross-sectional, analytical type study.</p> <p><b>Setting and Participants:</b> It was conducted in Government basic schools located in both rural and urban municipalities of Nepal. In total there were 276 students of both sexes. Multistage sampling was used; first, municipalities and schools were chosen through a lottery style method. Then students were selected using simple random sampling, based on a random number table.</p> <p><b>Methods:</b> Anthropometric measurements were taken. For children aged 3–8 years, mid-upper arm circumference (MUAC) was measured, while body mass index (BMI) was used for children above 8 years. Besides, a structured questionnaire was applied to capture dietary habits and household related factors, like parental education and whether the child received MDM.</p> <p><b>Results:</b> The mean age of participants was <math>7.76 \pm 3.229</math> years, and about 50.4% were male. For the MUAC group (3–8 years), mean MUAC was <math>14.84 \pm 1.35</math> cm. For the BMI group (&gt;8 years), mean BMI was <math>14.98 \pm 2.50</math> kg/m<sup>2</sup>. Severe acute malnutrition showed up in 4.3% of children aged 3–5 years. Nutritional status was significantly linked with age (<math>p=0.007</math>) and sex <math>p=0.008</math> as well. Parental education, meaning both parents, was also significantly associated with child nutritional status (<math>p=0.001</math>). Children not receiving MDM at school had significantly higher vulnerability to malnutrition (<math>p=0.015</math>). Overall, MDM was seen as a significant protective factor against malnutrition, with AOR =0.364, 95% CI: 0.139–0.953. Further, children without school-provided MDM had 1.913 times higher likelihood of malnutrition compared with those receiving MDM (95% CI: 0.867–4.22, <math>p=0.002</math>).</p> <p><b>Conclusion:</b> In conclusion, malnutrition among Nepali schoolchildren appears to be clearly linked to things like parental education, the intake of energy-dense nutrient-poor EDNP foods, and whether schools actually provide midday meals. It s kind of like these factors move together, and when they do, the nutritional situation tends to worsen. So, by reinforcing and improving MDM</p> |

---

programs, it may help lower childhood malnutrition in both rural and urban school contexts.

---

*Corresponding Author:*

Aruna Gyawali

PhD Scholar, Central Department of Home Science, Tribhuvan University, Nepal.

Email: [msgyawali.aruna@gmail.com](mailto:msgyawali.aruna@gmail.com)

---

Copyright © 2024 The Author(s). This is an open access article distributed under the Creative Commons Attribution License, (<http://creativecommons.org/licenses/by/4.0/>) which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

## 1. INTRODUCTION

Nutritional status is one of the strong markers of children's health and a good nutrition is very essential their overall growth and development [1]. The term "nutritional status" describes an individual's state of health as it relates to nutrient utilization. Only by correlating data from a thorough medical and nutritional history, a physical examination, and the proper laboratory testing will it be ascertained [2]. As growth is an important indicator of health and nutritional status, which is recurrent illnesses and a poor diet can result in delayed growth [3]. To survive and thrive healthily proper nutrition is essential for children. A healthy diet helps kids develop into robust adults who can withstand illness, natural catastrophes, and other world crises and it also helps them learn and flourish in their communities in future [4]. Among children under five years old, malnutrition during childhood, all-inclusive of underweight, overweight, wasting, and stunting, is a leading cause of death and morbidity worldwide.

Malnutrition among children is a serious issue in South Asian region where prevalence of wasting is higher than the crucial public health threshold of 15%. But unfortunately, their nutritional status has been overlooked after the age of 5 which is great concern. There are very limited studies published which showed the concern on nutritional status of the young children and adolescents, which consists of mainly children attending basic schools.

## 2. RELATED WORK

According to World Health Organization (WHO) malnutrition refers to the status where there is an imbalance of vital nutrients that might be excesses or deficits in dietary intake, or poor nutrient use by the body itself [5]. Globally, 150.8 million children are stunted, 50.5 million are wasted and 38.3 million are overweight [6]. As per UNICEF, Nepal is among the ten countries in the world with the highest number of stunted children (Aryal, 2016).

In Nepal among children and adolescents (5-19 age group) 12.4% male and 8.4% are underweight, 19.2% male and 17.5% are overweight and obese males are 7.8% whereas females are 5.6% [6]. Basic School going children are that group of children who have started their preschool which might start from early of 2 years to 12 years of age group. In Nepal, the school education system consists of one year of pre-primary education as early childhood education development (ECED) and eight years is known as basic schools that is from grades 1-8 [7]. Across the globe 139 countries with at least 330.3 million children are receiving food through school meal programs [8].

After reform of Federal government and 2015 Constitution Act 2015, the community and government schools are getting funds from the government for Mid-day meal (MDM) to provide nutritious meal to children [9]. In Nepal, the midday meal program has several benefits, such as boosting student enrollment, attendance, and retention in the school, enhancing academic performance, as well as preserving the health of the young children [10]. The findings of this study will allow the researcher and audience to

have a better understanding about role of MDM in nutritional status of the children attending basic schools and providing mid-day meals.

The aim of the study was to find out the nutritional status of schoolchildren attending basic schools in rural and urban municipalities. And to compare the nutritional status among children having Mid-day meal (MDM) in school and those who haven't received the MDM.

The study was based on the Conceptual Framework for cause of Malnutrition developed by UNICEF and revised in 2020.

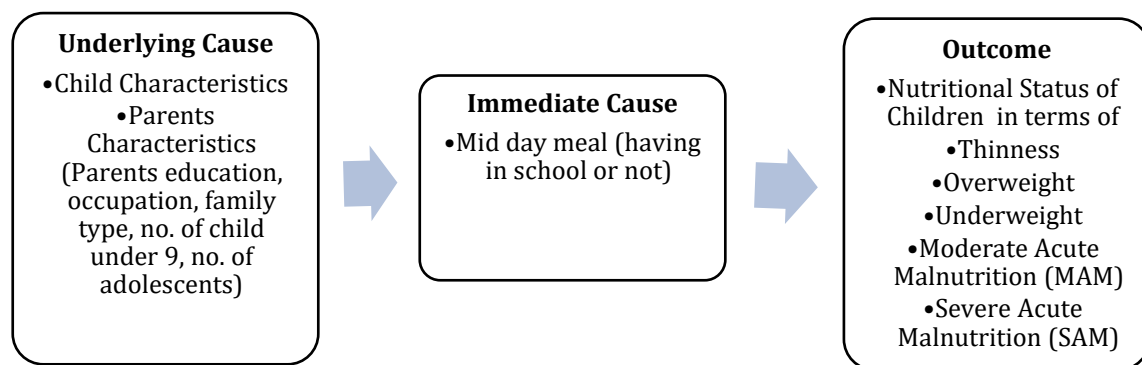


Figure 1. Adapted from Conceptual Framework on Maternal and Child Nutrition, UNICEF 2020

### 3. METHODOLOGY

A cross sectional, analytical study design was conducted. Multistage sampling techniques were used where the lottery method was used for the selection of municipalities and schools. A simple random sampling technique was used for the selection of students. Where a table of random numbers was used to select the representative study population. For the selection of study area three different geographical regions were sorted Mountain, Hill and Terai region. And from each geographical region three third level of governance area was selected randomly; which were Indrawati Municipality from Mountain region Kathmandu Metropolitan city from Hill region and Kawasoti Municipality from Terai region. And from each local government division; three basic schools were selected by lottery method. Only government schools providing mid-day meal were included for the study purpose. Study population was school children, with sampling unit 3-14 years old school going children attending government basic school providing mid-day meal. Sample size was calculated from infinite population with help of Cochran's formula [11]  $n = \frac{z^2 pq}{e^2}$ .

The prevalence of thinness is 20% among school children [12]. Thus, the final sample by keeping 10% response rate was 270 but total collected sample was 276. Data collection tools consisted of Equipment that was used in the study were Digital weighing machine, having capacity of 0-100 kg Height measuring scale (Stadiometer):- The height measuring tape of 5ft capacity (1 piece). The minimum measurement capacity was 0.1cm. MUAC: MUAC tape used which was designed by UNICEF, among two S0145620 MUAC, Child 11.5 Red/PAC-50 was used [13]. The questionnaires included of three sections which will be: A socio-demographic questionnaire, anthropometric measurement, and a food-related questionnaire.

Anthropometric measurement was done under the guidelines provided by FANTA anthropometry guideline module 3 [14], and WHO Anthro plus (Anthropometric measurement and analysis process) [15].

Primary data was collected using semi-structured questionnaire and by anthropometric measurement. Interview was conducted with parents/ caretakers/ guardians available at that time. The height of children was measured using stadiometer placed on hard flat surface with line of sight perpendicular to the horizontal surface. Weight was measured by an electronic digital weighing scale and read to the nearest 0.1 kg with minimal clothing and no shoes. For data analysis Univariate analysis was used to describe the percentages and number distributions, mean and std. dev of the respondents by socio-demographic characteristics and other relevant variables in the study. The nutritional status was measured by WHO Standards. Z-scores of height-for-ages and BMI-for-age for each child were calculated based on the WHO criteria. Bivariate Analysis is done under which categorical association of underlying and immediate variables are done with Nutritional status by using inferential statistics like Chi-square, and linear by linear. Variables which had a significant association in bivariate analysis were further analyzed in multivariate analysis.

#### 4. RESULTS AND DISCUSSION

A total of 276 students (3-14 years; 139 girls) with mean age  $7.74 \pm 3.229$  years. Among them 236 received Mid-day meal from the schools while only 40 students had meal out from the school. Among the receiver of MDM more than half of the students were male i. e. 52.5% and among the non-receiver of MDM 47.5% were male. Among 40 students who had MDM out from the school the minimum age was 5 and maximum age was 14 with mean age  $9.8 \pm 3.27$  years old. The MUAC was taken of only 93 students of age 3-5 among which 14 didn't received any MDM from the school. Table 1 summarizes the demographic characteristics of the students.

**Table 1.** Anthropometric Measurement Comparison Between Those Receiving MDM and Non-Receiving from School in All Three Basic Schools of Three Areas

| Variables                | MDM Receiving in Among 236 In % | Non -MDM Receiving Among 40 in % |
|--------------------------|---------------------------------|----------------------------------|
| Age                      | $9.0 \pm 3.05$                  | $9.8 \pm 3.27$                   |
| Height (cm)              | $125.3 \pm 18.0$                | $129.22 \pm 19.35$               |
| Weight (kg)              | $25.3 \pm 10.4$                 | $29.65 \pm 15.4$                 |
| BMI (kg/m <sup>2</sup> ) | $13.24 \pm 6$                   | $14.28 \pm 7.0$                  |
| MUAC (cm)                | $14.9 \pm 1.42$                 | $13.8 \pm 1.49$                  |

Further, the anthropometric measurement was analyzed with WHO Anthro plus to rule out the percentage of malnutrition and stage of malnutrition. Table 2 shows the status of malnutrition among students in terms of BMI-for-Age among age group 5-14, whereas severity of malnutrition in terms of SAM, MAM among age group 3-5 through MUAC. Table 2 and Table 3 gives a view on nutritional status of students.

**Table 2.** Nutritional Status Related Characteristics of Under 5 Age Group

| Age       | Malnutrition (SAM) | Moderate Acute Malnutrition (MAM) | Normal Nutritional Status |
|-----------|--------------------|-----------------------------------|---------------------------|
| 3-5 years | < 115 mm           | $\geq 115$ to < 125 mm            | $\geq 125$ mm             |
| Percent   | 4.3%               | 6.5%                              | 89.2%                     |

**Table 3.** Nutritional Status Related Characteristics of Age Group 5-14

|  |  | Z-score |
|--|--|---------|
|--|--|---------|

| Nutritional Status                             | Age  | <-3                | >3 To <-2            | >-2 To <-1 | >-1 To <+1 | >+1 To <+2     | >+2 To <+3 | >+3 Above |
|------------------------------------------------|------|--------------------|----------------------|------------|------------|----------------|------------|-----------|
| BMI-for -Age<br>Thinness<br>Overweight/obesity | 5-14 | Severe<br>thinness | Moderate<br>Thinness | Normal     |            | Over<br>weight | Obesity    |           |
|                                                |      | 9.3                | 48.4                 | 40.9       |            | 1.3            | —          |           |
| Height-for- age                                | 5-14 |                    |                      |            |            |                |            |           |
| Male                                           |      |                    | 47.9                 | 52.6       |            |                |            |           |
| Female                                         |      |                    | 39.3                 | 60.7       |            |                |            |           |

Among those students receiving MDM from schools 5.1% were suffering from acute malnutrition in either form whereas, among who were not receiving MDM from school 21.4% were having either form of malnutrition i.e MAM or SAM.

As for those whose BMI was analyzed, among those not receiving MDM in schools 60% were suffering from mild thinness to severe thinness, whereas students who received MDM only 13.8% were suffering from mild to severe thinness.

To establish the association between MDM and nutritional status of the student's bivariate analysis was performed. The Chi- Square test revealed that there is a significant association between age and sex with Malnutrition status of students under age 5 with p value 0.007 and 0.008 respectively. Similarly, MDM also played a vital role in nutritional status of students of age 3- 5 with p value 0.015.

Among the age group 5-14 various factors showed association with their nutritional status. To check the association the age group 5-14 was sub categorized to age group 5-9 and above 9, where it showed that age also played crucial role in maintenance of better nutritional status of student with p value 0.001. Both mother and father's education were significantly associated with nutritional status of children with p value 0.001 both, as well as MDM also showed significant association with nutritional status of the students.

Furthermore, multivariate analysis was done to explore more on cause of malnutrition among the students. Where it showed that students receiving MDM in school have been 1.913 (CI: 0.867-4.22) times better than those are not receiving MDM in schools with p value 0.002. Parents education also played a crucial role in nutritional status of the students. The nutritional status of students increased by 2.616 (CI: 1.073- 6.378) when father is educated and by 3.259(CI: 1.406-7.553) times when mother is educated, with p values 0.035 and 0.006 respectively.

#### 4.1. Discussion

Nutritional status is one of the most used and accurate method which measures a child's health and overall growth and development which significantly depend on healthy eating habit. There are various studies which revealed the nutritional status of children but very few had addressed the relation between mid-day meal and nutritional status of children. As MDM is very important part of school going children that has directly or indirectly relation with nutritional status of a child [16].

In a report published by to global Nutrition report 2022 it indicated that the prevalence of thinness among male child and adolescents was 12.4% which is in contrast with present study where prevalence of thinness among male is 65.7 %. Similarly, the prevalence of thinness among females is much higher than the national report i.e. 65.5% in the present study but 8.4% as presented by the Global Nutrition report in the country profile: Nepal. And in national report overweight is 1% which is similar to this study where overweight is seen among 1.3% of the students. Among all only 85.5% students were receiving MDM in schools, this might be because their disparities between all three schools on getting incentives from government sector for MDM in school.

In the present study the there is significant association between MDM and the nutritional status of students is with a p-value of 0.015, which is similar to study done in Ghana in 2018 where school feeding program was significantly associated with nutritional status of child with p value 0.028 [17].

While exploring all the factors related to nutritional status of students MDM along with mother and father education was also significantly associated. In availability of all three condition i.e. receiving MDM, parents' literacy the student's chance of having better nutritional status is increased by 1.9 times to 3.2 times.

## 5. CONCLUSION

Conclusively, the author can say that nutritional status of a child is directly or indirectly affected by the parent's education more of mother education, meal they are having in schools, unhealthy eating habits and age as well. A well-established nutrition education in an educational setting can help to address this problem to fulfill the Sustainable development goal target of Zero Hunger, Good Health and Well-being to combat poverty in long run.

A similar study can be done in private school setting where MDM is not provided and can be done in senior classes as well to establish a better view on children and adolescents' nutritional status.

### Acknowledgments

The authors have no specific acknowledgments to make for this research.

### Funding Information

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

### Author Contributions Statement

| Name of Author | C | M | So | Va | Fo | I | R | D | O | E | Vi | Su | P | Fu |
|----------------|---|---|----|----|----|---|---|---|---|---|----|----|---|----|
| Aruna Gyawali  | ✓ | ✓ | ✓  | ✓  |    | ✓ |   | ✓ | ✓ | ✓ | ✓  |    |   |    |

C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

E : Writing - Review & Editing

Vi : Visualization

Su : Supervision

P : Project administration

Fu : Funding acquisition

### Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

### Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

### Ethical Approval

Not Applicable.

### Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

## REFERENCES

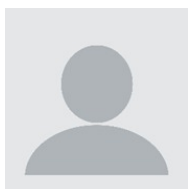
- [1] S. R. Das, J. Prakash, C. Krishna, K. Iyengar, P. Venkatesh, and S. S. Rajesh, 'Assessment of nutritional status of children between 6 months and 6 years of age in Anganwadi centers of an urban area in



- Tumkur, karnataka, India', Indian J. Community Med., vol. 45, no. 4, pp. 483-486, Oct. 2020. [doi.org/10.4103/ijcm.IJCM.523.19](https://doi.org/10.4103/ijcm.IJCM.523.19)
- [2] B. Srilakshmi, B. Dietetics, and E. Srilakshmi, New Age International (p) Limited. 2016.
- [3] P. P. Patel, P. A. Patel, S. A. Chiplonkar, A. V. Khadilkar and A. D. Patel, "Effect of mid-day meal on nutritional status of adolescents: A cross-sectional study from Gujarat," Indian Journal of Child Health, vol. 3, no. 3, pp. 303-307. [doi.org/10.32677/IJCH.2016.v03.i03.006](https://doi.org/10.32677/IJCH.2016.v03.i03.006)
- [4] UNICEF, "Nutrition," UNICEF Nepal, 2024.
- [5] topics/malnutrition#tab=tab\_1.
- [6] Country Nutrition Profile -Nepal. 2022.
- [7] P. Kundu, 'Nepal Education Fact Sheet', Nepal England Education Support.
- [8] 'School Meal Programs Around the World: Results from the 2021 Global Survey of School Meal Programs', in Global Child Nutrition Foundation, 2022.
- [9] R. Chikanbanjar, Education ethos. Kathmandu, Bagmati: The Kathmandu Post, 2017.
- [10] K. P. Tripathi, 'Mid-Day Meals Programs in the school of Pokhara through child Friendly School Manual', Janapriya J. Interdiscip. Stud., vol. 12, no. 1, pp. 80-94, Dec. 2023. [doi.org/10.3126/jjis.v12i1.62243](https://doi.org/10.3126/jjis.v12i1.62243)
- [11] H. K. Sarmah and B. B. Hazarika, 'Importance of the size of Sample and its determination in the context of data related to the schools of greater Guwahati', Bulletin of the Gauhati University Mathematics Association, vol. 12, pp. 19-46, 2012.
- [12] P. Raut, 'Comparative Nutritional Study Between The School Children Aged 5-10 Years Of Private And Public Schools Of Gauradaha Municipality, Jhapa', Institute of Science and Technology, 2018.
- [13] UNICEF, "MID-UPPER ARM CIRCUMFERENCE (MUAC) MEASURING TAPES".
- [14] K. C. A. L. Oot, Anthropometry: A Practical Tool for Program Planners, Managers, and Implementers. Washington, DC, 2018.
- [15] WHO, "WHO Anthro Survey Analyser," World Health Organization, 2019.
- [16] 'School health and nutrition: From principles to practice'. [Online]. Available: <https://www.childhealthtaskforce.org/sites/default/files/elearning/shn-course/index.html#/lessons/-DFxF44TD8fKSJK8ULWK213AF9PPvYbk>.
- [17] UNICEF Conceptual Framework on Maternal and Child Nutrition. 2020.

**How to Cite:** Aruna Gyawali. (2024). Nutritional status of children attending basic schools providing mid-day meal a comparative study. Journal Healthcare Treatment Development (JHTD), 4(2), 81-87. <https://doi.org/10.55529/jhtd.46.1.8>

## BIOGRAPHIE OF AUTHOR



**Aruna Gyawali**, is a PhD scholar at the Central Department of Home Science, Tribhuvan University, Nepal. Her research interests center on women's and adolescent health, with a focus on menstrual hygiene management. She has served as a primary investigator on studies examining self-care practices and knowledge related to menstrual hygiene among adolescent girls, contributing to the growing body of work on reproductive health and gender-sensitive public health issues in Nepal. Email: [msgyawali.aruna@gmail.com](mailto:msgyawali.aruna@gmail.com)