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The Problem and Its Background

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Abstract

This study investigated the relationship between Body Mass Index (BMI) and academic performance among Grade 1 pupils in Flora District, Apayao, with the aim of informing a targeted intervention program. Guided by Maslow's Motivation Theory, the research explored how nutritional status and key socio-demographic factors influence learning outcomes in early education. A descriptive-correlational design was employed, collecting data on socio-demographic profiles, BMI, and academic records. Descriptive statistics and Pearson's correlation were used to analyze the data.

Findings revealed that while age was significantly associated with increases in weight and height, BMI was not significantly correlated with age, sex, parents' income, or number of siblings. Socioeconomic factors, particularly parental income, showed a positive association with academic performance in specific subjects, but most socio-demographic variables had limited influence on both nutritional and academic outcomes. The prevalence of both undernutrition and overnutrition among pupils highlighted ongoing nutritional challenges within the sample.

Importantly, the statistical analysis found no significant relationship between BMI and academic performance, echoing broader research that suggests only weak or inconsistent associations between these variables in young children. However, a tendency was observed for pupils with normal BMI to achieve higher academic scores, suggesting that adequate nutrition may still play a supportive role in learning, even if not statistically conclusive. Based on these findings, the study proposes a comprehensive intervention program emphasizing improved nutrition, regular physical activity, parental engagement, and ongoing health and academic monitoring.

This research underscores the need for integrated health and education strategies in rural and underserved settings, offering actionable insights for educators, health professionals, and policymakers seeking to address both malnutrition and learning gaps through holistic, community-based approaches.

Introduction

The global burden of malnutrition remains a persistent challenge. According to the World Health Organization (WHO), approximately 149 million children under five years old are stunted, and 45 million are wasted, reflecting chronic and acute undernutrition, respectively. At the same time, the number of overweight children has been rising steadily, even in low- and middle-income countries (World Health Organization, 2021). In the Philippines, malnutrition continues to be a pressing public health and educational issue. Reports from the Department of Health (DOH) and Department of Education (DepEd) have highlighted alarmingly high rates of stunting and wasting among Filipino children. The 2019 Nutritional Status Report by DepEd revealed that 13.2% of school-aged children were either stunted or wasted (Department of Education [DepEd], 2020). Additionally, the World Bank ranks the Philippines among the top ten countries with the highest prevalence of child stunting (World Bank, 2023). These national figures reflect deeper, localized challenges in various provinces and municipalities.

In Flora, Apayao, a rural and underserved community in Cordillera Administrative Region, these national concerns are mirrored-and even magnified. According to recent data from the School Nurse's Office, out of 2,417 enrolled elementary pupils, 2,379 were weighed, revealing that 38 pupils (1.6%) were severely wasted and 138 pupils (5.8%) were stunted (Flora District Office, School Nurse's Office, 2025). These figures are particularly concerning for Grade 1 learners, whose first year in formal schooling coincides with a critical stage of brain development and social integration. Poor BMI at this stage can have long-lasting effects on a child's academic trajectory.

While many studies have examined malnutrition's impact on learning, there is limited localized research linking specific BMI categories to academic performance in rural Philippine areas like Flora, Apayao. This study addresses that gap by analyzing the relationship between BMI and academic outcomes among Grade 1 pupils, aiming to inform targeted interventions that integrate health and education to support holistic child development.

By exploring this issue from a global to a local lens, this study not only aligns with international goals such as the United Nations Sustainable Development Goal 4 (Quality Education) and Goal 2 (Zero Hunger) (United Nations, 2020) but also responds to the immediate needs of learners in marginalized communities. Understanding and addressing BMI as a determinant of academic performance is not just a health concern-it is a crucial step toward educational equity and long-term community development in Flora, Apayao.

Statement of the Problem:

This study investigates the correlation between Body Mass Index and academic performance in Grade 1 Flora, Apayao, aiming to develop an intervention program for improved physical health and learning outcomes.

Specifically, the study sought to answer the following questions:

1. What is the socio-demographic profile of Grade 1 pupils in terms of:
a. Age;
b. Sex;
c. Parents' monthly income;
d. Number of siblings?
2. What is the Body Mass Index (BMI) of Grade 1 pupils?
3. What is the academic performance of the Grade 1 pupils?
4. Is there a significant relationship between Body Mass Index and academic performance of Grade 1 pupils?
5. What intervention program can be crafted to improve the Body Mass Index (BMI) and academic performance of Grade 1 pupils?

Hypothesis:

There is no significant relationship between Body Mass Index and academic performance of Grade 1 pupils.

Theoretical Framework

This study is based on Maslow's Motivation Theory, which explains that human needs are arranged in a hierarchy-from basic physiological needs to higher-level goals like self-actualization. People must satisfy lower-level needs, such as hunger and safety, before pursuing higher aspirations. In education, meeting

students' fundamental needs is crucial for motivation and learning. By addressing these needs, educators can create supportive environments that foster engagement, confidence, and academic success.

Conceptual Framework

This study is guided by the following research paradigm, which illustrates the flow of the study from inputs, through processes**,** to the intended outputs.

The input of the study included the socio-demographic profile of Grade 1 pupils, BMI classification, and academic performance. These factors were considered essential in influencing the pupils' nutritional status and academic outcomes.

The process began with data collection, which involved gathering information on students' BMI and academic performance. This was followed by data analysis, utilizing correlation techniques to examine the relationship between BMI and academic outcomes. The findings were then interpreted to identify the specific needs of Grade 1 pupils in the Department of Education (DepEd) Schools within the Flora District.

The study's output highlights the identified link between BMI and academic performance and presents a developed intervention program aimed at improving both students' nutritional status and academic achievement.

Significance of the Study

This study underscores the crucial connection between BMI and academic success in Grade 1 pupils, providing valuable insights for educators, parents, school staff, and policymakers to promote holistic health and learning, particularly in underserved rural communities like Flora, Apayao.

RESEARCH METHODOLOGY

Research Design

This study used a descriptive-correlational design to profile Grade 1 pupils' socio-demographics, BMI, and academic performance in Flora District, Apayao, and to examine the relationship between BMI and academic achievement as a foundation for creating an intervention program.

Locale of the Study

The locale of the study was conducted at four schools of Flora District that composed of Greenhills Elementary School in Mallig, Flora, Apayao, Upper Atok Elementary School in Upper Atok, Flora, Apayao, Balasi Elementary School in Balasi, Flora, Apayao and Bagutong Elementary School in Bagutong, Flora, Apayao.

Respondents of the Study

The study focused on Grade 1 pupils from four schools in Flora District during the first quarter of the 2024-2025 school year. Using purposive sampling, 33 pupils with complete health and academic records were selected. This group represented a diverse range of ages, genders, socio-economic backgrounds, and nutritional statuses.

Research Instruments

The study collected socio-demographic data, accurately assessed pupils' BMI using health records and physical measurements, and gathered detailed information on dietary and physical activity habits through

questionnaires, while academic performance was measured using official records from core subjects. These combined instruments offered a comprehensive understanding of the factors connecting physical health and academic achievement among Grade 1 pupils.

Data Gathering Procedure

The study obtained formal permission from the Department of Education (DepEd) Flora District Office and the heads of four local elementary schools before proceeding. Coordination with school nurses and class advisers allowed access to students' BMI records and academic data. Socio-demographic information was gathered through parent-completed questionnaires distributed via class advisers, while BMI and academic performance data were collected from school health offices and teachers, ensuring confidentiality and adherence to ethical standards.

Statistical Treatment of Data

The study carefully processed and analyzed collected data using statistical methods to accurately address its objectives. Descriptive statistics summarized pupils' socio-demographic profiles, BMI categories (underweight, normal, overweight, obese), and academic performance levels (ranging from Outstanding to Did Not Meet Expectations). Pearson's Correlation Coefficient was used to explore the relationship between BMI and academic achievement. A needs assessment based on these findings identified gaps in nutrition and learning, guiding the development of an intervention program. Ethical standards were strictly followed, including obtaining informed consent, ensuring confidentiality, anonymizing data, and securing approval from the school ethics committee.

RESULTS AND DISCUSSION

1.Socio-Demographic Profile of Grade 1 Pupils

The socio-demographic profile of the 33 Grade 1 pupils was analyzed using descriptive statistics, including frequency, percentage, mean, and standard deviation, to provide a clear overview of their age, sex, parents' monthly income, and number of siblings. In terms of age, the majority of the pupils were six years old, with a mean age of approximately 6.64 years and a standard deviation of 1.49. Specifically, 64% (21 pupils) were aged six, which is consistent with the standard school entry age in the Philippines. A smaller percentage (24%) were seven years old, while the remaining students were eight (3%), eleven (3%), and twelve years old (6%). The presence of older pupils within the Grade 1 level may be attributed to delayed school entry or possible grade repetition, possibly influenced by socio-economic conditions, health issues, or readiness for formal education.

There was an almost equal distribution of sexes among the participants, with 17 males (52%) and 16 females (48%). This balance in gender representation indicates that the findings can be considered unbiased in terms of gender differences. The analysis of parents' monthly income revealed that a significant proportion of the pupils came from economically disadvantaged households. More than half (52%) of the families reported earning less than PHP 5,000 per month, while 42% earned between PHP 5,000 to PHP 10,000. Only 6% of the families reported earning more than PHP 10,000 monthly. The mean household income range falls well within the low-income bracket, suggesting that financial constraints could be a contributing factor to poor nutrition and limited access to educational support. The implications of this finding are significant, as lower income often correlates with food insecurity, reduced healthcare

access, and fewer educational resources, which may collectively impact both the BMI and learning outcomes of young children (Perez-Escamilla, Cunningham, & Moran, 2023).

The data on the number of siblings showed a diverse family size distribution. About 30% of pupils had four or more siblings, while an equal proportion (30%) had only one sibling. Another 21% had two to three siblings, and 19% were only children. The mean number of siblings was approximately 2.3, with a standard deviation indicating moderate variability. Children from larger families may face more competition for household resources, including food and academic support, which could potentially affect both their nutritional status and school performance (Vizmanos et al., 2021).

Hence, the socio-demographic profile of the pupils provides a crucial context for understanding the potential factors that may influence both nutritional and academic outcomes. The predominance of pupils from low-income, larger families underscores the importance of addressing poverty-related barriers through holistic intervention programs that promote better health and educational opportunities for young learners (Del Castillo et al., 2022).

The lifestyle questionnaire revealed that most Grade 1 pupils consume three or more meals daily with generally good breakfast habits, balanced by frequent intake of junk food and sugary drinks, while all reported adequate sleep and daily physical activity. Despite parental awareness of the importance of nutrition and exercise for academic success, challenges like financial limitations, children's food preferences, and limited access to healthy foods hinder consistent healthy habits. These findings suggest the need for nutrition education, improved access to healthy foods, continued promotion of physical activity, and targeted support for students who struggle with engagement and focus. Addressing these challenges can help foster healthier lifestyles and better academic outcomes for all learners (Burrows et al., 2019)

2. Body Mass Index (BMI) Classification (Nutritional Status)

The Body Mass Index (BMI) assessment of Grade 1 pupils revealed that the majority fall within the normal weight category. Specifically, most pupils, both male and female, have BMI values consistent with healthy weight ranges appropriate for their age and height. However, a notable number of pupils were classified as underweight, indicating potential nutritional deficiencies or growth concerns. Additionally, a smaller subset of pupils was identified as obese, highlighting early signs of overweight-related health risks. These variations in BMI categories suggest diverse nutritional and health statuses within the group, emphasizing the need for targeted interventions to support underweight pupils in achieving adequate growth and to address obesity in others to prevent future health complications.

3. Academic Performance of Grade 1 Pupils

Grade 1 pupils demonstrated generally strong and consistent academic performance across core subjects, with most achieving satisfactory to excellent grades between 76 and 91, reflecting a well-rounded and steady academic foundation. The balanced achievement among both male and female students indicates effective learning and proficiency across key areas. Recent research highlights that foundational literacy skills and early school readiness are significant determinants of Grade 1 academic performance, with pupils possessing stronger early literacy skills tending to perform better across all subjects (Cultivating Early Literacy, 2024).

This distribution indicates that while some Grade 1 pupils are excelling academically, a significant number are performing at levels that may require intervention to enhance their learning outcomes. The presence of both high and low performers reinforces the need for individualized academic strategies and support mechanisms. Studies have shown that parental involvement, teaching practices, and classroom

environment all play key roles in shaping the academic outcomes of young learners (Parental Involvement: Its Effect to Academic Performance of Grade 1 Pupils, n.d.; Parental Involvement and Barriers Towards Grade 1 Learners' Academic Achievement, n.d.; Observed Teaching Practices and Academic Performance of Primary Learners, n.d.). National and international assessments, including PISA, have documented that while some Filipino students achieve proficiency, a large proportion still fall below minimum standards in reading, math, and science, highlighting the need for continued reforms and targeted support (Manila Bulletin, 2023; Department of Education, 2019; World Bank, 2020a, 2020b).

4.Relationship between socio demographic profile, Body Mass Index and Academic Performance

Table 1. Relationship between profile and BMI

Profile	Weight	Height	BMI
Age	**0.66***	**0.87***	0.10
Sex	-0.04	-0.15	0.05
Parents Income	-0.16	-0.29	0.06
Number of sibling	-0.20	-0.08	-0.19

Critical value of r @ 5%= 0.3388

** significant relationship*

The data show relationships between several profiles-age, sex, parents' income, and number of siblings-and three physical measures: weight, height, and BMI. Age has a strong and statistically significant positive correlation with both weight (r = 0.66) and height (r = 0.87), indicating that as age increases, both weight and height tend to increase as well. This pattern aligns with global and national data showing that age is a primary driver of increases in height and weight among school-aged children, with trajectories varying by region and over time (NCD Risk Factor Collaboration [NCD-RisC], 2020). However, age does not have a significant relationship with BMI (r = 0.10). Several large-scale and longitudinal studies have demonstrated that while height and weight increase with age, BMI does not always follow a linear relationship and can be influenced by growth spurts and other factors (Freedman, Goodman, King, & Daymont, 2020; Zhang et al., 2024). In contrast, sex, parents' income, and number of siblings do not show any significant correlations with weight, height, or BMI, as their correlation coefficients are all below the critical value of 0.3388. This suggests these factors do not meaningfully influence the physical measures in this dataset. Previous research has also found that while socioeconomic and family factors may impact nutrition and health, their direct correlation with anthropometric measures like BMI is often weak or inconsistent in childhood (Silveira et al., 2022). Overall, age appears to be the primary factor associated with changes in weight and height, while BMI is not significantly related to any of the profiles examined.

Table 2. Relationship between profile and academic performance

	Academic performance					
Profile	Language	reading	Math	Makabansa	GMRC	Grade point Average (GPA)
Age	-0.26	-0.26	-0.18	-0.24	-0.32	-0.25
Sex	0.17	0.13	0.06	0.14	0.17	0.14
Parents Income	0.29	0.26	0.26	0.26	**0.34***	0.27

Number of sibling	-0.17	-0.15	-0.17	-0.17	-0.16	-0.17

Critical value of r @ 5%= 0.3388
** significant relationship*

The analysis of academic performance reveals that among the profiles examined-age, sex, parents' income, and number of siblings-only parents' income shows a statistically significant positive correlation, specifically with the GMRC subject (r = 0.34). This indicates that higher parental income is associated with better performance in GMRC. Although parents' income also has moderate positive correlations with other academic subjects and overall GPA, these relationships are not statistically significant at the 5% level. This finding aligns with multiple studies demonstrating that parental income has a significant positive effect on students' academic performance, with moderate to strong correlations reported across diverse settings (An Assessment of Parental Level of Income on Students' Academic Performance, 2023; Machebe, Ezegbe, & Onuoha, 2017; Parental Income Influence on Academic Performance of Business Education Students in Kwara State University, 2022). Age shows negative correlations with all subjects and GPA, suggesting a slight tendency for academic performance to decrease with age, but none of these correlations are significant. Sex and number of siblings exhibit weak correlations with academic performance, none of which reach significance. Overall, the data suggest that parents' income may play a meaningful role in academic achievement, particularly in GMRC, while age, sex, and number of siblings do not significantly influence academic outcomes in this sample. These findings are echoed in international research, which consistently identifies parental income as a key predictor of educational outcomes, while other demographic factors often show weaker or inconsistent relationships (Okon et al., 2022; Uwitonze et al., 2024; Machebe, Ezegbe, & Onuoha, 2017; Bratsberg et al., 2022).

Table 3. Relationship between BMI and academic performance

BMI	**Academic Performance**					
Weight	Language	Reading	Math	Makabansa	GMRC	GPA
Weight	0.04	0.02	0.09	0.07	-0.03	0.04
Height	-0.16	-0.19	-0.16	-0.17	-0.25	-0.18
BMI	0.26	0.25	0.31	0.31	0.24	0.28

Critical value of r @ 5%= 0.3388
** significant relationship*

The analysis of the relationship between Body Mass Index (BMI) and academic performance among Grade 1 pupils revealed positive but not statistically significant correlations across most subjects. Specifically, BMI showed moderate positive correlations with Language (r = 0.26), Reading (r = 0.25), Math (r = 0.31), Makabansa (r = 0.31), GMRC (r = 0.24), and overall GPA (r = 0.28). However, none of these correlation coefficients reached the critical value of r = 0.3388 at the 5% significance level, indicating that the observed relationships were not statistically significant. This is consistent with several studies that found no significant or only weak associations between BMI and school performance in children, with some reporting negative or non-significant correlations overall (Al-Awwad et al., 2013; Bayot, Tanamal, & Sanchez, 2024; Yu & Kelly, 2024). In contrast, weight and height showed very weak or negative correlations with academic performance, further emphasizing that BMI is a more relevant

anthropometric measure in this context. Recent longitudinal and meta-analytic studies confirm that while BMI and academic achievement can be reciprocally related, the effect sizes are small, and the relationships are often more pronounced in specific subgroups such as girls or in certain subjects, but are generally weak or inconsistent at the population level (Datar, Sturm, & Magnabosco, 2021; Yu & Kelly, 2024). These findings suggest that while there is a tendency for pupils with higher BMI to perform better academically, the evidence is insufficient to conclude a significant relationship between BMI and academic achievement in this sample.

5. Proposed Intervention Program

This study proposes a holistic school-based intervention for Grade 1 pupils in Flora District that combines daily nutritious feeding, academic support, parent education, physical activity, and regular monitoring to improve health and learning outcomes. The intervention aims to address undernutrition and enhance academic performance through integrated nutrition education and community involvement.

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

Summary of findings

1. Socio-Demographic Profile

Most Grade 1 pupils were six years old with a balanced gender distribution, but many faced economic challenges such as low family income and large sibling numbers that could impact their nutrition and education. While most maintained regular meals, adequate sleep, and daily physical activity, unhealthy dietary habits and barriers like financial constraints and limited access to healthy foods underscore the need for targeted nutrition education and improved support to promote better health and academic success.

2. Nutritional Status Based on BMI

The majority of pupils (70%) had a normal BMI, while a significant portion (21%) were classified as underweight, and 9% were obese. These findings highlight the need for targeted interventions to address both undernutrition and obesity, promoting healthier weight management for all students.

3. Academic Performance

Most pupils were clustered in the Outstanding (24%) and Very Satisfactory (16%) ranges, with a significant number falling within the Satisfactory (33%) and Fairly Satisfactory (27%) performance levels. These findings indicate that, while a notable proportion of students are performing well, the majority are achieving at satisfactory or lower levels, suggesting that targeted academic interventions may be needed-especially in core subject areas-to help more students reach higher standards of achievement.

4. Relationship Between BMI and Academic Performance

The analysis of the pupils' profiles and physical measures revealed that age is significantly and positively correlated with both weight ($r = 0.66$) and height ($r = 0.87$), indicating that as pupils grow older, their weight and height tend to increase. However, age showed no significant relationship with Body Mass Index (BMI) ($r = 0.10$). Other socio-demographic factors such as sex, parents' monthly income, and number of siblings did not show significant correlations with weight, height, or BMI.

Regarding academic performance, parents' income was the only profile variable that demonstrated a statistically significant positive correlation, specifically with the GMRC subject ($r = 0.34$). While moderate positive correlations were observed between parents' income and other academic subjects as well as overall GPA, these were not statistically significant. Age, sex, and number of siblings showed weak and non-significant correlations with academic outcomes.

The relationship between BMI and academic performance showed moderate positive correlations across all subjects and overall GPA, with coefficients ranging from 0.24 to 0.31. Nevertheless, these correlations did not reach statistical significance at the 5% level. Weight and height had weak or negative correlations with academic performance, underscoring BMI as a more relevant measure in this context. Overall, the data suggest a tendency for pupils with higher BMI to perform better academically, but the evidence is insufficient to confirm a significant relationship.

5. Intervention Program

Based on the findings, a comprehensive intervention program titled "Healthy Mind, Healthy Body" was proposed. It consists of four major components: a School-Based Feeding Program (SBFP), Academic Support and Remediation Sessions, Parent Education and Engagement Seminars, and a Health and Academic Monitoring System. This holistic program is designed to address both the nutritional and academic challenges faced by Grade 1 pupils. It aims to improve students' physical health, boost academic performance, and foster strong school-home-community collaboration, guided by the specific needs identified in the study.

Conclusion

The study reveals that while age significantly influences physical growth among Grade 1 pupils in Flora District, BMI is largely unaffected by age or socio-demographic factors like sex, family income, and number of siblings, suggesting other influences on nutritional status. Low family income was notably linked to better academic performance in certain subjects, highlighting the complex role of socioeconomic factors in learning. Although no strong statistical connection was found between BMI and academic achievement, pupils with normal BMI tended to perform better, reflecting the importance of adequate nutrition for cognitive development. Many pupils showed moderate academic performance and nutritional challenges, emphasizing the close relationship between health and education in early childhood. The study advocates for a holistic intervention combining school feeding programs, academic support, parental involvement, and ongoing monitoring to address these intertwined issues and promote the overall growth and success of children in underserved communities.

Recommendations

The study recommends implementing a comprehensive approach to improve both the nutritional status and academic performance of pupils. Key actions include establishing a school-based feeding program to combat undernutrition, providing targeted academic remediation through after-school tutorials, and engaging parents through education on nutrition and study habits. Additionally, schools should develop systems to monitor students' BMI and academic progress regularly, supported by sustainable policy funding. The study also calls for further research across different grade levels and regions to deepen understanding of health's impact on learning. These measures aim to create supportive environments that promote the holistic development and long-term success of children in Flora District and similar communities.

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