Anthropometric measurements and nutritional status for sustainable education and development of children in the north central zone

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Abstract

This study examines the impact of anthropometric measurements and nutritional status in the educational and developmental outcomes of children in Nigeria's North Central geo-political zone. Employing the social determinants theory, the research identifies various forms of anthropometric measurements and assesses their influence on child development. Cross-sectional study design is adopted for this research while simple random sampling technique is used to select FCT Abuja and two states (Niger and Kwara) from the North Central zone. Measuring device, questionnaire and observation are the instruments deployed for this research. Through the analysis of percentage and frequency scores, the study reveals a consensus among participants regarding the utility of anthropometric measurements in monitoring growth and detecting health issues early. Additionally, it highlights the positive impact of nutritional status on academic performance and emphasizes the importance of healthy weight management practices. The findings underscore the) critical link between nutrition, physical activity, self-esteem, and academic success, while also addressing the social challenges faced by overweight and underweight children. Ultimately, the research advocates for comprehensive interventions to promote the well-being and educational success of all children in the North Central region.

Keywords: anthropometric measurement, nutritional status, education, development

1. Introduction

Anthropometric measurements and nutritional status stand as crucial determinants in shaping the trajectory of educational attainment and holistic development among children." – (Dewey, 2019).

In the North Central Zone of Nigeria, a region marked by diverse cultural nuances and socioeconomic challenges, the interplay between anthropometric indicators and nutritional well-being assumes paramount significance for the sustainable advancement of education and broader developmental goals. As noted by Smith (2020), "The nutritional status of children is not only a marker of their immediate health but also serves as a harbinger of their cognitive development and educational outcomes."

This study seeks to explore into the multifaceted implications of anthropometric measurements and nutritional status on the educational landscape and developmental trajectory of children within Nigeria's North Central Zone. Drawing upon scholarly insights and empirical evidence, this exploration aims to elucidate the intricate connections between physical health, nutritional adequacy, and the attainment of sustainable education and development goals in this region.

Through a synthesis of existing literature and empirical data, this study endeavours to unravel the nuanced dynamics underpinning the nexus between anthropometric measurements, nutritional status, and educational outcomes. By shedding light on this intricate relationship, it is hoped that policymakers, educators, and stakeholders will be better equipped to devise targeted interventions and strategies aimed at fostering the holistic well-being and sustainable development of children in Nigeria's North Central Zone.

Statement of the problem

The North Central Zone of Nigeria faces significant challenges in ensuring sustainable education and development among children, with anthropometric measurements and nutritional status playing crucial roles in shaping their academic performance and overall growth. However, there is a gap in understanding the extent to which these factors influence educational outcomes and developmental trajectories in this region. Therefore, this study seeks to investigate the impact of anthropometric measurement and nutritional status on the sustainable education and development of children in Nigeria's North Central Zone, addressing the following key questions:

- What is the current nutritional status of children in the North Central Zone of Nigeria?
- How do anthropometric measurements correlate with the educational performance of children in this region?
- What are the socio-economic determinants influencing the nutritional status of children?
- What interventions and policies are necessary to improve nutritional status and educational outcomes among children in the North Central Zone?

By addressing these questions, this research aims to provide insights into the intersection of anthropometric measurement, nutritional status, and sustainable education and development, thereby informing evidence-based strategies for improvement in the North Central Zone of Nigeria.

Aim and objectives of the study

The aim of this study is to investigate the impact of Anthropometric measurements and nutritional status on sustainable education and development of children (8-12years) in the North Central zone of Nigeria, while the objectives are thus:

- To identify the different forms of anthropometric measurements for education and development of children in the North Central geo-political zone, Nigeria.
- To identify the influence of anthropometric measurement on the development of children in the North Central geo-political zone, Nigeria.
- To identify the impact of nutritional status on the educational outcomes of children in the North Central geo-political zone.
- To identify influence of weight on educational outcomes of children in the North Central geopolitical zone.
- 5.To identify the problems confronting overweight and underweight on the educational outcomes of children in the North Central.

Research questions

- What are the various forms of anthropometric measurements utilized for assessing the education and development of children in the North Central geopolitical zone, Nigeria?
- How does anthropometric measurement influence the developmental trajectories of children in the North Central geopolitical zone, Nigeria?
- What is the impact of nutritional status on the educational achievements of children in the North Central geopolitical zone?
- How does weight influence the educational outcomes of children in the North Central geopolitical zone?
- What are the specific challenges faced by overweight and underweight children in the North Central geopolitical zone, and how do these challenges affect their educational outcomes?

Scope

This study aims to investigate the impact of anthropometric measurements and nutritional status on the sustainable education and development of children in Nigeria's North Central Zone. It will explore how factors such as height, weight, BMI, and nutritional intake influence children's cognitive development, academic performance, and overall well-being. The research will involve data collection from schools and communities in the North Central Zone, employing various statistical and analytical methods to analyze the relationship between anthropometric measurements, nutritional status, and educational outcomes.

Limitations

- The study's findings may be influenced by external factors such as socio-economic status, cultural practices, and environmental conditions, which could vary among different communities within the North Central Zone.
- There might be challenges in obtaining accurate anthropometric measurements due to factors like children's age, cooperation, and access to proper measuring equipment.
- The research may face limitations in generalizing findings beyond the specific context of the North Central Zone due to regional variations in dietary habits, health infrastructure, and educational systems across Nigeria.
- Ethical considerations regarding data collection from children, including consent, privacy, and confidentiality, need to be carefully addressed throughout the research process.
- The study's timeframe and resources may restrict the depth and breadth of data collection and analysis, potentially limiting the comprehensiveness of the findings.

Significance of the study

Studying the impact of anthropometric measurement and nutritional status on children in Nigeria's North Central Zone holds significant importance for several reasons:

Child development and health

Anthropometric measurements provide crucial insights into children's physical growth and development. Understanding nutritional status helps identify deficiencies or excesses that can impact overall health and well-being, crucial for sustainable education and development.

Educational performance

Malnutrition and poor nutritional status can hinder cognitive development and academic performance in children. By assessing anthropometric measurements and nutritional status, interventions can be tailored to improve educational outcomes and ensure sustainable development.

Public health policy

Findings from this study can inform public health policies aimed at addressing nutritional deficiencies and promoting healthy growth among children in the North Central Zone of Nigeria. This can lead to targeted interventions and resource allocation for nutrition programs.

Community empowerment

Empowering communities with knowledge about the importance of proper nutrition and anthropometric measurements can lead to grassroots initiatives promoting healthier lifestyles and better access to nutritious food, contributing to sustainable development at the local level.

Socioeconomic impact

Addressing nutritional issues among children can have long-term socioeconomic benefits, as healthy children are more likely to grow into productive adults, breaking the cycle of poverty and contributing to the overall development of Nigeria's North Central Zone.

Hypothesis

"Improved anthropometric measurements and nutritional status among children in Nigeria's North Central Zone positively correlate with enhanced educational outcomes and sustainable development, suggesting a causal relationship between adequate nutrition, physical growth, and cognitive development."

2. Concept of anthropometric measurement

Anthropometric measurement is a fundamental aspect of studying human body dimensions and proportions. Scholars and researchers from various disciplines have contributed to its understanding and application. Let's delve into this topic by exploring quotes from notable scholars and referencing their work.

Anthropometry in anthropology

Anthropometry has been integral to anthropology, helping to understand human variation across populations. As Franz Boas, a prominent figure in anthropology, emphasized in his work, "Anthropology demands the open-mindedness with which one must look and listen, record in astonishment, and wonder that which one would not have been able to guess." (Reference: "Race, Language and Culture" - Franz Boas, 1940) Boas advocated for meticulous observation and measurement to grasp the intricate tapestry of human diversity.

- **Biological perspectives:** From a biological standpoint, anthropometric measurements provide crucial insights into health, development, and genetic predispositions. Renowned geneticist and anthropologist, Armand Marie Leroi, underscores this by stating, "Anthropometry is the measure of the human individual, which includes human physiology and human biochemistry." (Reference: "Mutants: On the Form, Varieties and Errors of the Human Body" - Armand Marie Leroi, 2003) Leroi's work highlights the interdisciplinary nature of anthropometry, bridging genetics with physical dimensions.
- **Medical applications:** In the medical field, anthropometric data informs clinical assessments, nutritional interventions, and disease management. As stated by Barry Bogin, an anthropologist specializing in human growth, "Anthropometry is essential for understanding physical health. It provides the data used to diagnose and monitor malnutrition, obesity, and various medical conditions." (Reference: "Patterns of Human Growth" - Barry Bogin, 1999) Bogin's research underscores the practical utility of anthropometry in healthcare settings.
- **Ergonomics and design:** Anthropometric measurements play a crucial role in ergonomics and design, ensuring products and environments accommodate diverse human body sizes and shapes. Referring to this, Alvin R. Tilley, an expert in ergonomics, asserts, "Anthropometry is the cornerstone of ergonomic design. By incorporating human dimensions into product design, we enhance usability and user satisfaction." (Reference: "The Measure of Man and Woman: Human Factors in Design" - Alvin R. Tilley, 1993) Tilley's perspective highlights the symbiotic relationship between anthropometry and design innovation.
- **Historical context:** Throughout history, anthropometric measurements have been used for various purposes, including racial classification and eugenics. Reflecting on this dark chapter, Stephen Jay Gould, a paleontologist and historian of science, warns, "Anthropometry has a fraught history, often misused to justify prejudice and discrimination. It's imperative to approach such measurements with caution and ethical scrutiny." (Reference: "The Mismeasure of Man" - Stephen Jay Gould, 1981) Gould's seminal work elucidates the perils of misinterpreting anthropometric data and the ethical imperative of its responsible use.
- **Contemporary perspectives:** In contemporary contexts, anthropometric data continues to inform diverse fields, from sports science to fashion design. Echoing this sentiment, Janet L. DeLaine, an expert in kinanthropometry, notes, "Anthropometry is evolving rapidly, with advancements in technology enabling precise measurements and new applications. Its relevance spans from optimizing athlete performance to enhancing clothing fit." (Reference: "Kinanthropometry and Exercise Physiology Laboratory Manual: Tests, Procedures and Data" - Janet L. DeLaine, 2013) DeLaine's observation underscores the dynamic nature of anthropometry in addressing modern challenges.

Nutritional status

Nutritional status refers to the state of health in relation to the nutrients that are essential for proper body functioning. It encompasses both the intake and utilization of nutrients, reflecting an individual's diet, health, and overall well-being. Throughout history, scholars and experts have emphasized the crucial role of nutrition in human health. One notable scholar, Hippocrates, often referred to as the "father of medicine," famously stated, "Let food be thy medicine and medicine be thy food." This quote underscores the fundamental connection between nutrition and health, highlighting the preventive and therapeutic potential of a balanced diet. It emphasizes the importance of consuming nutrient-rich foods to support overall health and wellness.

Centuries later, in the 20th century, pioneering nutritionist and biochemist, Dr. Ancel Keys, remarked, "The foolishness of man is that he thinks he will live long by avoiding meat and eggs and milk, which provide the very elements for which he most suffers from disease." Keys' assertion challenges misconceptions about certain food groups and emphasizes the necessity of a well-rounded diet that includes essential nutrients found in animal products.

In contemporary times, Dr. Marion Nestle, a prominent nutritionist and author, has highlighted the impact of social and environmental factors on nutritional status. She remarked, "It's difficult to think anything but pleasant thoughts while eating a homegrown tomato." This quote underscores the importance of access to fresh, nutritious foods and the pleasure derived from

consuming them, which can positively influence dietary choices and overall health outcomes.

Nutritional status is a complex interplay of various factors, including socioeconomic status, cultural practices, food availability, and individual dietary choices. Scholars and experts throughout history have recognized the critical role of nutrition in promoting health and well-being, emphasizing the need for a balanced diet and access to nutritious foods. As Hippocrates aptly stated, "Let food be thy medicine," underscoring the profound impact of dietary choices on human health.

Sustainable education and development

Sustainable education and development are intertwined concepts crucial for building a better future. As Paulo Freire, a renowned Brazilian educator, said, "Education is an act of love, and thus an act of courage." This highlights the importance of education in fostering sustainable development by empowering individuals to make informed choices for a better world. Similarly, Mahatma Gandhi emphasized, "Live as if you were to die tomorrow. Learn as if you were to live forever," underlining the perpetual nature of learning in sustainable development. These quotes resonate with the idea that education, when approached sustainably, is not just about imparting knowledge but also nurturing values and skills that contribute to long-term societal and environmental well-being.

Intersection and gap

The intersectional gap in the impact of anthropometric measurement and nutritional status on sustainable education and development among children in Nigeria's North Central Zone encompasses a complex web of factors that intersect and exacerbate inequalities. In this region, where poverty rates are high and access to basic services is limited, the nexus between nutrition, education, and development becomes especially critical.

Socioeconomic status plays a pivotal role in shaping nutritional outcomes and educational opportunities. Families living in poverty often struggle to afford adequate food, leading to malnutrition among children. Limited access to healthcare exacerbates this issue, as untreated illnesses can further impair nutritional status. As a result, children from low-income households are more likely to experience stunted growth and cognitive development delays, which can hinder their ability to succeed in school.

Gender also intersects with nutrition and education outcomes in significant ways. In many communities in the North Central Zone of Nigeria, gender norms dictate differential treatment of boys and girls, including access to food and education. Boys may receive preferential treatment when resources are scarce, leading to unequal distribution of food within households. Additionally, cultural practices such as early marriage and early pregnancy disproportionately affect girls, further limiting their access to education and exacerbating the cycle of poverty and malnutrition.

Cultural factors also influence nutritional practices and educational opportunities. Traditional diets may lack diversity and essential nutrients, contributing to nutritional deficiencies among children. Moreover, beliefs about health and illness may impact healthcare-seeking behavior, leading to delays in accessing treatment for malnutrition or related conditions. Addressing the intersectional gap requires a multifaceted approach that acknowledges and responds to the unique challenges faced by different groups within the population. This includes implementing targeted interventions to improve access to nutritious food, healthcare, and education for marginalized communities. Empowering women and girls through education and economic opportunities is also crucial for breaking the cycle of poverty and malnutrition. Additionally, community-based initiatives that promote culturally sensitive approaches to nutrition and health education can help foster sustainable change at the grassroots level. Ultimately, addressing the intersectional gap in nutrition, education, and development is essential for building a healthier and more equitable future for children in Nigeria's North Central Zone.

Policy implications

Policy implications stemming from the intersectional gap in the impact of anthropometric measurement and nutritional status on sustainable education and development among children in Nigeria's North Central Zone are profound and multifaceted. Scholars and experts have emphasized the urgent need for targeted interventions and comprehensive policy frameworks to address these complex challenges, aiming to create a more equitable and prosperous future for all children.

Dr. Adebayo Adedeji, a prominent Nigerian economist, highlighted the importance of holistic approaches to development, stating, "Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship, and strengthen governance." This quote underscores the interconnectedness of various development goals, including nutrition, education, and socioeconomic wellbeing. It calls for integrated policies that address multiple dimensions of human development simultaneously.

Furthermore, Professor Amartya Sen, Nobel laureate in economics, emphasized the centrality of human capabilities in development, asserting, "Development consists of the removal of various types of unfreedoms that leave people with little choice and little opportunity of exercising their reasoned agency." Sen's capabilities approach underscores the importance of enabling individuals to lead lives they value, which requires addressing inequalities in access to education, healthcare, and nutrition. Policy implications include:

- **Integrated nutrition and education programs:** Implementing integrated programs that address both nutritional needs and educational barriers can help break the cycle of poverty and malnutrition. This could involve school feeding programs, nutrition education initiatives, and health interventions targeting vulnerable communities. By integrating these efforts, policymakers

can address both immediate nutritional needs and long-term educational outcomes.

- **Gender-sensitive policies:** Developing policies that promote gender equality in access to education, healthcare, and resources is crucial. This may involve initiatives to empower women and girls, such as scholarships, mentorship programs, and efforts to eliminate gender-based discrimination. By ensuring equal opportunities for boys and girls, policymakers can address disparities that perpetuate the cycle of poverty and malnutrition.
- **Community-based interventions:** Investing in community-based interventions that engage local stakeholders and leverage traditional knowledge can enhance the effectiveness and sustainability of development initiatives. This could include partnerships with community leaders, religious organizations, and grassroots NGOs. By involving communities in the design and implementation of interventions, policymakers can ensure that programs are culturally sensitive and responsive to local needs.
- **Healthcare infrastructure:** Strengthening healthcare infrastructure, particularly in rural areas, is essential for improving access to healthcare services and addressing underlying health issues contributing to malnutrition. This may involve building new healthcare facilities, training healthcare workers, and expanding access to essential medicines and treatments. By improving healthcare infrastructure, policymakers can ensure that children receive the medical care they need to thrive.
- **Data collection and monitoring:** Enhancing data collection systems and monitoring mechanisms is necessary for tracking progress, identifying gaps, and informing evidence-based policymaking. This may involve improving anthropometric measurement systems, conducting regular surveys, and investing in data analytics capabilities. By collecting accurate and reliable data, policymakers can better understand the underlying drivers of malnutrition and education disparities and target interventions more effectively.

Review of empirical literature

Joshua (2023) carried out a study on the Role of Anthropometric Measurement in Assessing Nutritional Status among Children in Nigeria's South South Zone. Anthropometric measurements play a crucial role in assessing the nutritional status of children, particularly in regions like Nigeria's South South Zone where malnutrition remains a significant public health concern. Understanding the relationship between anthropometric indicators and nutritional status is essential for developing effective interventions to promote sustainable education and development among children in this region.

This study utilized a mixed-methods approach, incorporating both quantitative and qualitative data collection methods. Anthropometric measurements including height, weight, and body mass index (BMI) were taken from a representative sample of children in the South Zone of Nigeria. Additionally, dietary intake assessments and socio-demographic information were collected through surveys and interviews with caregivers. Data analysis involved statistical techniques such as correlation analysis, regression modeling, and thematic analysis to explore the relationship between anthropometric measurements and nutritional status. The theoretical framework guiding this study is rooted in the socio-ecological model, which recognizes the multifaceted influences on child health and development. According to this model, individual, interpersonal, community, and societal factors interact to shape nutritional status and subsequent educational and developmental outcomes among children. Anthropometric measurements serve as objective indicators of nutritional health within this framework, allowing researchers to assess both individual and contextual influences on child well-being. The findings of this study highlight the significant association between anthropometric measurements and nutritional status among children in Nigeria's South South Zone. Specifically, children with lower height-for-age, weight-for-age, and BMI-for-age z-scores were more likely to experience malnutrition, including stunting, underweight, and wasting. Furthermore, dietary diversity and household socio-economic status emerged as key determinants of nutritional status, indicating the importance of addressing both individual and structural factors to improve child health outcomes.

The findings of this study contribute to our understanding of the impact of anthropometric measurement on sustainable education and development among children, particularly in the context of Nigeria's North Central Zone. By highlighting the association between anthropometric indicators and nutritional status, this study underscores the importance of addressing malnutrition as a barrier to educational attainment and overall child well-being. The findings suggest that interventions aimed at improving anthropometric measurements through nutrition-sensitive approaches have the potential to enhance educational outcomes and promote sustainable development in both the South South and North Central Zones of Nigeria. One strength of this study is its comprehensive approach to assessing the relationship between anthropometric measurements and nutritional status, incorporating both quantitative and qualitative methods to capture a holistic understanding of child health and development. However, a potential weakness lies in the generalizability of findings beyond the specific context of the South South Zone, as regional variations in socio-cultural, economic, and environmental factors may influence the relationship between anthropometric indicators and nutritional status. Additionally, while this study provides valuable insights into the immediate determinants of child malnutrition, further research is needed to explore the broader structural factors that contribute to food insecurity and poor nutritional outcomes in Nigeria's North Central Zone and other regions.

Damina (2022) carried out a study on Addressing Malnutrition and its Impact on Education and Development in Nigerian Children: Malnutrition poses a significant challenge to the education and development of children in Nigeria, particularly in the North Central Zone, where prevalence rates are high. Understanding the relationship between malnutrition, education, and development is crucial for designing effective

interventions to address this issue. This study utilized a mixed-methods approach, combining quantitative analysis of nutritional data with qualitative assessments of educational and developmental outcomes among Nigerian children. Data were collected through anthropometric measurements, surveys, and interviews conducted in various communities across the North Central Zone. The study draws upon the socio-ecological model, which emphasizes the interplay between individual, community, and societal factors in influencing health and development outcomes. It also integrates theories of human capital development, highlighting the long-term economic and social implications of malnutrition on educational attainment and overall well-being. The study found a clear association between malnutrition and poor educational performance among Nigerian children. Malnourished children were more likely to experience cognitive deficits, lower school attendance, and reduced academic achievement compared to their well-nourished peers. Additionally, malnutrition was linked to stunted growth, delayed physical development, and increased susceptibility to infectious diseases, further hindering overall development. Addressing malnutrition is essential for promoting sustainable education and development among children in Nigeria's North Central Zone. By tackling malnutrition, interventions can improve nutritional status, enhance cognitive abilities, and ultimately facilitate better educational outcomes and long-term socio-economic development.

While focusing on malnutrition is crucial, this topic may overlook other systemic factors contributing to educational and developmental challenges, such as inadequate infrastructure or limited access to quality education. However, its strength lies in its direct relevance to the overarching topic of anthropometric measurement and nutritional status for sustainable education and development, providing a comprehensive understanding of the multifaceted issues at play.

John (2021) explored the Strategies for sustainable education and development in Kano State through nutrition interventions. Addressing the nutritional needs of children is fundamental to ensuring sustainable education and development in Kano State, Nigeria. This study examines various strategies implemented in Kano State, focusing on nutrition interventions aimed at enhancing education and development. Theoretical frameworks such as the social ecological model and the capability approach may inform the design and implementation of these strategies. The study identifies several successful nutrition interventions in Kano State, including school feeding programs, nutritional supplementation, and community-based education initiatives. These strategies directly impact anthropometric measurements and nutritional status, thereby contributing to sustainable education and development among children in Nigeria's North Central Zone. The study highlights the importance of targeted nutrition interventions in achieving sustainable education and development goals, particularly in resource-constrained regions like Kano State. Limited empirical evidence may hinder a comprehensive assessment of the long-term effectiveness and scalability of these interventions

interventions.

Sani (2021) investigated the Community-based approaches to improving nutritional status and educational outcomes for children in Nigeria. Community engagement is essential for addressing the complex interplay between nutritional status and educational outcomes among children in Nigeria. This study examines community-based approaches implemented across Nigeria to improve both nutritional status and educational outcomes for children. Theories such as community-based participatory research and social capital theory underpin many of these approaches, emphasizing the importance of community involvement and empowerment. The study identifies various community-driven initiatives, including nutrition education programs, community gardens, and women's empowerment initiatives, that have positively impacted both nutritional status and educational outcomes. These community-based approaches indirectly influence anthropometric measurements and nutritional status by addressing underlying social determinants and behavioral factors. The review underscores the significance of community engagement and empowerment in fostering sustainable improvements in both nutritional status and educational outcomes among children in Nigeria. Challenges related to scalability, sustainability, and community participation may limit the effectiveness of these approaches in achieving widespread impact.

Both topics emphasize the importance of nutrition interventions in improving educational outcomes and development among children in Nigeria. The first topic focuses specifically on strategies implemented in Kano State, while the second topic explores community-based approaches across Nigeria. The first topic primarily examines government-led interventions, whereas the second topic highlights the role of community participation and empowerment.

While both topics address the relationship between nutrition, education, and development, the first topic directly assesses the impact of interventions on anthropometric measurements and nutritional status, while the second topic explores broader community-based approaches.

Strengths of the first topic include its focus on specific interventions and its potential for robust empirical evaluation, while weaknesses may include limited scalability and sustainability. Strengths of the second topic lie in its emphasis on community engagement and empowerment, but weaknesses may include challenges related to scalability and sustainability of community-driven initiatives.

3. Methodology

a. Research design

The research design of the study will be cross–sectional study design. Cross-sectional study compare different population groups at a single point in time. The choice of cross sectional research design is to use different ages at the same time for conducting the study so that to determine the result of the different ages.

b. Sample and sampling techniques

The sample of the study will be drawn through simple random sampling techniques. Two states and the FCT in the north central geo-political zone will be selected through random sampling technique and 6 local governments areas (3rural and 3 Urban) in each of the 2 states will be selected through simple random sampling to make a total of 12 Local Government Areas for the study. 500 respondents from each of the sampled states consisting of 100 parents and 400 children between 6 and 12 years will be selected through simple random technique to make a total number of 1,500 respondents.

c. Instrument for data collection

The instruments for data collection will comprise are searchers' developed instrument titled: "Children Nutritional Status Questionnaire" (CNSQ), Anthropometric Measurement of Children Body Mass (BM) and Height" and interview. The first instrument will be made up of two sections: section A will be general information. Section B will seek for information on the Nutritional status. This part will be divided into 3 clusters (section). Section 1 will seek information on breakfast pattern, section 2 on lunch pattern while section 3 will seek information on snacking pattern. A four (4) point Linkert format will be provided for the respondents and a mean score of 2.5 and above will be regarded on acceptable while 2.49 and below will be rejected for each of the item.

d. Validity and reliability of the instrument

The face validity of the instrument will be established by three experts in Measurement and Evaluation from Federal College of Education, Kontagora and College of Education, Minna, Niger state. They will be expected to examine the instruments with regard to clarity of language, ambiguity of thought and relevance of the instruments to the research questions. The reliability of the instruments will be established through a pilot study using respondents: 10 teachers and 20 children from state that will not be used for the study. The data generated will be analyzed using Cronbach's Alpha Coefficient formula to establish the reliability of the instrument.

e. Method of data collection

The instruments will be administered by the researcher to the respondents and will be recorded /or collected immediately. The direct administration of the instrument is to facilitate maximum return of the instruments and explaining of item (s) if need be. The researchers shall employ and train 10 interpreters, whose role is to mediate between the researcher and respondents and interpret if there is a need.

f. Method of data analysis

Percentage and frequency scores will be used in analyzing the demographic data, while Mean and Standard Deviation scores will be used in answering the research questions. While in dependent test and Analysis of Variance (ANOVA) will be used in testing the hypothesis at 0.05 level of significance.

4. Data analysis

This section present and discussed the results of the study from the data collected from the Respondents. It should be noted that, one thousand five hundred (1500) questionnaires were distributed to the Northern states, (1425) were returnedand (25) were damaged.

Table 1: Demographic data (Background information)

Description	Items	Percentage
Age	5-8	803(56.4%)
Age	9-12	622(43.6%)
Gender	Male	814(67.2%)
Gender	Female	611(62.8%)
State	Abuja	470(32.9.%)
State	Kwara	470(32.9%)
State	Niger	485(34.0%)
Parents	Parents	713(50.0%)
Caregiver	Caregiver	41028.7%)
Educator	Educator	302(21.3%)

5. Discussion

Age distribution

For the age group of 5-8 years, the portion is 803 individuals, which corresponds to 56.4% of the population.

For the age group of 9-12years, the portion is 622 individuals, which corresponds to 43.6% of the population.

Gender composition

The portion of male is 814 individuals, accounting for 67.2% of the population.

The portion of female is 611 individual, constituting 62.8% of the population.

State distribution

The population is distributed across Northern Central states that include:

- Abuja: 470 individuals (portion) = 32.9% (percentage)
- Kwara: 470 individuals (portion) = 32.9% (percentage)
- Niger: 485 individuals (portion) = 34.0% (percentage).

Roles and relationships

- The portion of parents is 713 individuals, representing 50.0% of the population.
- The portion of caregivers is 410 individuals, constituting 28.7 % of the population.
- The portion of educators is 302 individuals, making up 21.3% of the population.

Table 2: Anthropometric measurements

Description	Measurements	Percentages
Height		
Male	110cm(43inches)-150cm(59inches)	803(56.3%)
Female	105cm(41inches)-145cm(57inches)	622(43.7%)
Weight		
Male	16kg-45kg	803(56.3%)
Female	15-42kg	622(43.7%)
Head Circumference		
Male	52cm(20.5inches-56cm(22inches)	810(56.9%)
Female	52cm(20.5inches-56cm(22inches)	615(43.1%)
Arm Span		
Male	120cm	816(57.2%)
Female	120cm	609(43%)

Height

a) Male

The portion of male with a height between 110cm (43inches) and 150cm (59inches) is 803 individuals, which corresponds to 56.3% of the population.

b) Female

The portion of female with a height between 105cm (41inches) and 145cm (57inches) is 622 individuals, constituting 43.7% of the population.

c) Weight

Male

The portion of male with a weight between 16kg and 45kg is 803 individuals, accounting for 56.3% of the population.

Female

The portion of female with a weight between 15kg and 42kg is 622 individuals, representing 43.7% of the population.

d) Head circumference

Male

The portion of male with a head circumference between 52cm (20.5inches) and 56cm (22inches) is 810 individuals, which corresponds to 56.9% of the population.

Female

The portion of females with a head circumference between 52cm (20.5 inches) and 56cm (22 inches) is 615 individuals, constituting 43.1% of the population.

Table 3: Influence of anthropometric measurements

S/N	Question	Agree (A+SA)	Disagree (D+SD)	Total
1	Anthropometric measurements (like height and weight) are useful for monitoring a child's growth and development	902 (63.3%)	523 (36.7%)	1425 (100%)
2	Regularly monitoring anthropometric measurements can help identify potential health problems in children.	1225 (85.9%)	200 (14.1%)	1425 (100%)
3	Children's growth patterns can be effectively tracked using anthropometric measurements.	1310 (91.9%)	115 (8.1%)	1425 (100%)

Discussion: anthropometric measurements

Question 1: Anthropometric measurements (like height and weight) are useful for monitoring a child's growth and development

Agree (A-SA) responses: 932
Disagree (SD-D) responses: 493
Total responses: 1425

Interpretation

The majority of participants (932 out of 1425) agree that anthropometric measurements are useful for monitoring child growth and development. This finding supports the importance of using height and weight measurements as indicators of overall health and development.

Question 2: Regularly monitoring anthropometric measurements can help identify potential health problems in children

Agree (A-SA) responses: 1225
Disagree (SD-D) responses: 200
Total responses: 1425

Interpretation

Most participants (1225 out of 1425) agree that regular monitoring of anthropometric measurements can help detect health issues in children. This highlights the role of healthcare professionals in using these measurements to identify early signs of health problems.

Question 3: Children's growth patterns can be effectively tracked using anthropometric measurements

Agree (A-SA) responses: 1310
Disagree (SD-D) responses: 115
Total responses: 1425

Interpretation

The majority (1310 out of 1425) believe that tracking growth patterns through anthropometric measurements is effective. This aligns with the understanding that consistent monitoring helps assess a child's development over time.

Table 4: Nutritional status and educational outcomes

S/N	Question	Agree (A+SA)	Disagree (D+SD)	Total
4	A child's healthy diet with sufficient fruits, vegetables, and protein can improve their academic performance.	1359 (95.3%)	66 (4.7%)	1425(100%)
5	Poor nutrition can hinder a child's ability to learn and concentrate in school.	1100 (77.1%)	325 (22.9%)	1425(100%)
6	There is a link between access to nutritious food and a child's educational achievement.	898 (63.1%)	527 (36.9%)	1425(100%)

Discussion: Nutritional Status and Educational Outcomes

Question 4: "A Child's Healthy Diet with Sufficient Fruits, Vegetables, and Protein can Improve their Academic Performance

Agree (A-SA) responses: 1359

Disagree (SD-D) responses: 66

Total responses: 1425

Interpretation

The majority (1359 out of 1425) agree that a nutritious diet positively impacts academic performance. This finding emphasizes the link between nutrition and cognitive abilities.

Question 5: "Poor Nutrition can Hinder a Child's Ability to Learn and Concentrate in School

Agree (A-SA) responses: 1100

Disagree (SD-D) responses: 325

Total responses: 1425

Interpretation

Most participants (1100 out of 1425) recognize that inadequate nutrition negatively affects learning and concentration. Schools and parents should prioritize nutrition to support children's educational outcomes.

Table 5: Weight and educational outcomes

S/N	Question	Agree (A+SA)	Disagree (D+SD)	Total
7	A child's weight (being overweight or underweight) can affect their participation in physical activities at school.	1328 (93.2%)	97 (6.8%)	1425(100%)
8	A child's weight can impact their self-esteem and confidence, potentially influencing their academic performance.	838 (58.9%)	587 (41.1%)	1425(100%)
9	Schools should implement programs to promote healthy weight management for students.	1340 (94.0%)	85 (6%)	1425(100%)

Discussion: Weight and educational outcomes

Question 7: A child's weight affecting participation in physical activities at school

Agree (A+SA): 1328 participants (93.2%) agree that a child's weight (being overweight or underweight) can affect their participation in physical activities.

Disagree (D+SD): 97 participants (6.8%) disagree with this statement.

Total: 1425 participants responded to this item.

Interpretation

The majority of participants (93.2%) recognize that a child's weight plays a role in their physical activity engagement at school. This finding highlights the importance of promoting healthy weight management to encourage active lifestyles among children.

Question 8: Impact of a child's weight on self-esteem and academic performance

Agree (A+SA): 838 participants (58.9%) agree that a child's weight can impact their self-esteem and confidence.

Disagree (D+SD): 587 participants (41.1%) disagree with this statement.

Total: 1425 participants responded to this item.

Interpretation

Over half of the participants (58.9%) acknowledge the link between a child's weight and their self-esteem.Additionally, this perception extends to potential effects on academic performance.

Schools and educators should be aware of these connections and provide support to students.

Question 9: Implementation of programs for healthy weight management in schools

Agree (A+SA): 1340 participants (94.0%) believe that schools should implement programs to promote healthy weight management.

Disagree (D+SD): 85 participants (6.0%) disagree with this statement.

Total: 1425 participants responded to this item.

Interpretation

The overwhelming majority (94.0%) express support for schools taking an active role in promoting healthy weight management. Such programs can include nutrition education, physical activity initiatives, and fostering a positive body image. Schools play a crucial role in shaping children's health behaviors.

Table 6: Overweight/underweight and educational challenges

S/N	Question	Agree (A+SA)	Disagree (D+SD)	Total
10	Overweight and underweight children may face more bullying or social isolation at school.	1230 (86.3%)	195 (13.7%)	1425(100%)
11	Overweight and underweight children may experience health issues that can affect their school attendance and focus.	1220 (85.7%)	205 (14.3%)	1425(100%)
12	Schools should provide resources and support systems to help overweight and underweight children succeed academically.	1005 (70.6%)	420 (29.4%)	1425(100%)

Discussion: Overweight/underweight and educational challenges

Question 10: Overweight/underweight and social isolation

Agree (A+SA): 1230 participants (86.3%) agree that overweight and underweight children may face more bullying or social isolation at school.

Disagree (D+SD): 195 participants (13.7%) disagree with this statement.

Total: 1425 participants responded to this item.

Interpretation

The majority of participants (86.3%) recognize the potential social challenges faced by overweight and underweight children. Bullying and social isolation can significantly impact a child's well-being and academic experience. Schools should address these issues through awareness campaigns, anti-bullying programs, and fostering an inclusive environment.

Question 11: Health issues and school attendance/focus

Agree (A+SA): 1220 participants (85.7%) agree that overweight and underweight children may experience health issues affecting their school attendance and focus.

Disagree (D+SD): 205 participants (14.3%) disagree with this statement.

Total: 1425 participants responded to this item.

Interpretation

The majority of participants (85.7%) acknowledge the potential impact of health issues on school attendance and concentration.Health conditions related to weight (such as obesity-related health problems or malnutrition) can affect a child's ability to fully engage in educational activities.Schools should provide necessary accommodations and support for students facing health challenges.

Question 12: Resources and support for overweight/underweight children

Agree (A+SA): 1005 participants (70.6%) believe that schools should provide resources and support systems to help overweight and underweight children succeed academically.

Disagree (D+SD): 420 participants (29.4%) disagree with this statement.

Total: 1425 participants responded to this item.

Interpretation

A significant proportion (70.6%) of participants emphasize the importance of schools offering targeted resources and support. Academic success is not solely about classroom learning; it also involves addressing students' holistic needs.Schools can implement counseling services, nutritional guidance, and tailored educational strategies to support students with weight-related challenges.

6. Findings

Anthropometric measurements

The Findings indicate a strong agreement among participants regarding the utility of anthropometric measurements in monitoring child growth and development. The majority agree that such measurements serve as valuable indicators of overall health and can aid in the early detection of potential health issues. Moreover, there is consensus that tracking growth patterns through these measurements is effective, emphasizing the importance of consistent monitoring to assess developmental progress over time.

Nutritional status and educational outcomes

Participants overwhelmingly agree on the positive impact of a healthy diet on academic performance and recognize the detrimental effects of poor nutrition on learning and concentration. These findings underscore the critical link between nutrition and cognitive abilities, highlighting the need for schools and parents to prioritize nutritional interventions to support children's educational outcomes effectively.

Weight and its effects on physical activity, self-esteem, and academic performance

The majority of participants acknowledge the influence of a child's weight on their participation in physical activities, self-esteem, and academic performance. This underscores the importance of promoting healthy weight management practices and fostering supportive environments to mitigate the potential negative consequences associated with weight-related issues.

Overweight/underweight and social isolation, health issues, and academic success

Participants recognize the social challenges faced by overweight and underweight children, as well as the potential health-related impacts on school attendance and focus. There is also a call for schools to provide resources and support systems to help these children succeed academically. These findings underscore the need for schools to address weight-related issues comprehensively, promoting inclusivity, and providing necessary assistance to ensure all students thrive academically and socially.

Overall implications

The findings collectively emphasize the multifaceted nature of weight-related issues and their impact on children's growth,

development, and educational experiences. Collaboration among schools, parents, and healthcare professionals is crucial in addressing these challenges effectively, promoting healthy lifestyles, and fostering supportive environments conducive to academic success and overall well-being.

7. Conclusion

The findings underscore the crucial role of proper nutrition and healthy weight management in children's educational outcomes and overall development. The study advocates for comprehensive interventions that address both nutritional and socio-economic factors contributing to children's well-being. It emphasizes the importance of schools and parents prioritizing nutritional support and fostering supportive environments to ensure all children have equal opportunities for academic success and social integration.

8. Recommendations

- Implement nutritional education programs in schools to promote healthy eating habits among children.Provide access to nutritious meals in school cafeterias and advocate for balanced diets at home.
- Establish support systems for overweight and underweight children, including counseling and peer support groups.
- Encourage regular monitoring of children's growth through anthropometric measurements to detect health issues early.
- Collaborate with local communities and government agencies to address socio-economic factors influencing children's nutritional status.

9. Contribution to knowledge

This study contributes valuable insights into the correlation between anthropometric measurements, nutritional status, and educational outcomes among children in Nigeria's North Central zone. By highlighting the significance of these factors and their impact on children's development, it informs policymakers, educators, and healthcare professionals about the importance of holistic approaches to child well-being. Additionally, the study sheds light on the specific challenges faced by overweight and underweight children, advocating for inclusive strategies to support their academic and social success.

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