Original Research Article

Health and Nutrition Profile of Children with Disabilities Attending Special School in Lafia, Nasarawa State: A Cross-Sectional Study

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ABSTRACT

Children With Disabilities (CWDs) on a global scale face a dual picture of malnutrition. In some locations, high rates of underweight and stunting are present while in others, overweight or obesity compared to their peers. Objectives of the study was to identify the prevalence of malnutrition among CWDs in Special School Lafia, North Central Nigeria and to assess the nutritional status of CWDs using parameters of anthropometry (Body height, weight and Body Mass Index (BMI)), hematology (Packed Cell Volume (PCV)) and fecal sample examination. Based on the type of disability, 'Hearing Impairment' was the most common at 66.5%, 'Learning Impairment' at 20.0%, 'Visual Impairment' (8.1%) and others (5.4%). The median body mass index (BMI) was 16.59 kg/m2 (IQR = 02.78), highlighting a general low body mass for age in the student population. Prevalence of anemia among the CWDs was 23.1% and helminthic infection 69.6%. Commonest helminthic infection was Ascaris Lumbricoides (80.9%) with Trichuris Trichura at 1.8%. Parasitic infection was significantly associated with type of disability (Fisher's Exact = 16.83, p < 0.001), with higher prevalence among pupils with learning impairment and those enrolled in early intervention program. There was a statistically significant association between age and anemia status (χ^2 = 12.92, p = 0.001), with anemia being more prevalent among younger pupils (5–9 years). Apart from introducing public health strategies to prevent malnutrition among CWDs in schools and in communities, future research should develop AI - augmented tools for easy identification and diagnosis of malnutrition.

Keywords: children with disability, malnutrition, stunting, anemia, helminthic

INTRODUCTION

Children With Disabilities (CWD) are a vulnerable population but share the same rights, and have health and nutritional needs as others do. The disabled children needs' may be peculiar but for us to help attain "Health for All" including those disabled, it calls for their needs to be prioritized. Children with disabilities can be described as those children who have long term physical, mental, intellectual or sensory impairments which in interaction with various barriers may hinder their full and effective participation in society on an equal basis with other children. These might be genetic and chromosomal abnormalities, also from serious injury, exposure to toxins,

nutritional deficiency, or infection that resulted in long-term functional consequences. [1-2] The Convention on the Rights of the Child (CRC) recognizes the human rights of all children, including those with disabilities. It has resulted in the 'Convention on the Rights of Persons with Disabilities (CRPD)' which provides a powerful umbrella to promote the human rights of all children with disabilities. [1]

At least one billion people of the world's population (15%) have some form of disability, which is present at birth or acquired later in life with nearly 240 million of them been children. [1] Health problems cannot be ruled out as they are exposed to issues affecting one or more systems. In Africa, less than 10% of children with a disability are in primary education. In some countries only 13% receive any form of education. In Bangladesh, 30% of people with disabilities have completed primary school, compared to 48% of those without disabilities. In Zambia it is 43% compared to 57% and in Paraguay 56% to 72% (TheirWorld, ND) CWD in LMICs s are 90% more likely to lack access to educational opportunities than CWD in developed countries. [3] Those with educational opportunities are posed with various health challenges that are unnoticed until adequate surveillance is ensured. Studies have shown from Multiple Indicator Cluster (MIC) surveys of 30 countries that children with disabilities are significantly more likely to experience all forms of malnutrition including wasting, stunting, underweight etc. [4]

Malnutrition is a major factor responsible for childhood mortality. Globally, evidence from meta-analysis and systematic reviews shows that children with disabilities were almost three times more likely to be underweight and nearly twice as likely to experience stunting and wasting. In addition, prevalence of underweight among children aged 5-19 since 2000, is 9.2%, obesity rates have increased from 3.0 % to 9.4%. [5] The 2023 update of the WHO SAM guidelines recognizes CWDs are at higher risk of malnutrition and incorporates 'targeted support' for disability into the management framework for severe malnutrition. [6] Malnutrition often arises from a complex interaction of factors, including socioeconomic status, gender inequality, political instability, food insecurity and poor nutritional intake. [7-10] Anemia has higher rates (20–25%) among children 5 to 19 years in low/middle-income countries (LMICs). From estimates of the Global Burden of Disease Study (GBD) 2021, anemia affected approximately 50–200 million children/adolescents in this age group, with years lived with disability (YLDs) at 10–15 million globally. Anemia is an indicator of both poor nutrition and poor health as studies show that severe anemia affects mental and physical development in children especially those with disabilities. [11] Anemia has been linked with helminthiasis. Disability Adjusted Life Years (DALY) estimates may represent "low-ball" figures based on revised estimates of more than 4 million DALYs from hookworm alone. [12]

In Nigeria, data on the health and nutritional status of CWDs, most especially those attending special schools, remain insufficient for the age group 5 to 19 years old. Previous studies are mostly focused on the general pediatric population and under 5 for CWDs, leaving a significant gap in understanding the burden and determinants of malnutrition, anemia, and parasitic infections among CWDs. Few studies have shown a significant association between age and gender for the nutritional status of disabled adolescents. [13] Addressing these gaps is essential for informing targeted interventions, strengthening school health programs, and improving responses through policy change/review for this vulnerable population. This study aims to assess the health and nutritional profile of children with disabilities (CWD) attending special school in Lafia, Nasarawa State, North Central -Nigeria as the study examines the prevalence of malnutrition, anemia, parasitic

infections and socio-demographic factors associated with these conditions.

Aims/ Objective

The study was to identify the prevalence of malnutrition among CWDs in Special School Lafia, North Central Nigeria and to assess the nutritional status of CWDs using parameters of anthropometry (Body height, weight and Body Mass Index (BMI)), hematology (Packed Cell Volume (PCV)) and fecal sample examination.

MATERIALS & METHODS

Study Area

Nasarawa state, in the North Central geopolitical zone in Nigeria, is within the latitude of 9.08'20" N and longitude of 8.19'97" E. It is positioned at altitude 181.35m above sea level with an average rainfall of 1182mm annually. [14] The study was carried out at Special School for Children with Disabilities in Lafia, the capital of Nasarawa State, North-Central Nigeria. The school provides ranging from educational to rehabilitative services to children with hearing, visual, learning, and developmental impairments and serves as a referral center for children with disabilities within Lafia Local Government Area (LGA) and surrounding communities and all local government areas of the state including others states of the country.

Research Design

This was a school based cross-sectional study conducted to assess the health and nutritional profile of Children with Disabilities attending Special School in Lafia, Nasarawa State, North Central - Nigeria.

Study Population

The study population comprised of children and adolescents with disabilities aged 5 to 19 years enrolled in the special school during the study period.

Eligibility Criteria

Inclusion criteria:

1. Children aged 5 to 19 years with diagnosed disabilities who are enrolled in the special school.
2. Children whose parents or caregivers provided written informed consent, with assent obtained from participants where appropriate.

Exclusion criteria:

1. Children who were acutely ill at the time of data collection.
2. Children whose physical characteristics would affect precise anthropometric measures.
3. Children whose caregivers declined consent.

Sample Size and Technique

A total population sampling technique was employed, whereby all eligible pupils enrolled in the special school during the study period were recruited. A census of all eligible pupils was conducted with a total of 260 children were included in the study.

Data Collection and Procedure

Data were collected using a structured interviewer administered questionnaire adapted from standardized nutrition and health assessment tools. Information obtained included socio-demographic characteristics and disability type.

Anthropometric measurements (weight and height) were taken following World Health Organization (WHO) standard procedures. Weight was measured to the nearest 0.1 kg using a calibrated weighing scale, while height was measured to the nearest 0.1 cm using a stadiometer. Body Mass Index (BMI) was calculated as weight in kilograms (kg) divided by height^2 (m^2). Indicators as 'weight for height', 'weight for age', 'height for age' were derived using the reference data by the World Health organization (WHO) for children aged from 5 to 19 years for anthropometric Z-scores. Interpretation for cut offs included BMI: Overweight: >+1SD (equivalent to BMI 25

kg/m² at 19 years), Obesity: >+2SD (equivalent to BMI 30 kg/m² at 19 years), Thinness: <-2SD, Severe thinness: <-3SD. Weight-for-age reference data was not available beyond age 10 because this indicator does not distinguish between height and body mass in an age period where many children are experiencing the pubertal growth spurt and may appear as having excess weight (by weight-for-age) when in fact they are just tall. Final height and weight values were obtained as means of the two measurements. Blood samples were collected by trained laboratory personnel to assess 'Packed Cell Volume' (PCV) using standard micro hematocrit methods. Anemia status was based on PCV values. Stool samples were collected and examined for intestinal parasitic infections using direct wet method and concentration techniques.

Data collectors and laboratory personnel were trained prior to the study. Daily calibration of measuring instruments was done. Duplicate anthropometric measurements were taken for each student and the average recorded. Completed questionnaires were checked daily for completeness and consistency. Limitations on the use of the 'WHO Anthro' software were noted.

Statistical Analysis

Data were entered and analyzed using The IBM statistical product and service solutions (IBM SPSS statistics), version 25.0 software. Descriptive statistics were used to summarize socio-demographic characteristics and prevalence of nutritional indicators. Categorical variables were presented as frequencies and percentages, while continuous variables were summarized using mean and standard deviation for normally distributed data or median and interquartile ranges for skewed data.

Bivariate analysis showing associations between socio-demographic factors and nutritional outcomes were assessed using Chi-square tests or Fisher's exact tests where appropriate. Binary logistic regression analysis was conducted to identify predictors of wasting, stunting, and underweight, with adjusted odds ratios (AORs) and 95% confidence intervals reported. Statistical significance was set at p- value < 0.05.

RESULT

Table 1: *Sociodemographic characteristics of pupils (n=260)*

Variable	Frequency	Percentage
Age Median (IQR)	13 (06)	
5-9	57	21.90
10-14	102	39.20
15-19	101	38.80
Sex		
Male	170	65.40
Female	90	34.60
Type of Disability		
Hearing impaired	173	66.50
Learning Impaired	52	20.00
Visual Impaired	21	08.10
Early Intervention	14	05.40

The median age was 13 years with IQR (6), with the majority aged 10–14 years (39.2%). Males were two thirds of the study population (65.4%), while females comprised 34.6%. Based on the type of disability, 'hearing impairment' was the most common 66.5%, with 'learning impairment' at 20.0%, 'Visual impairment' at 8.1%, and others (students enrolled in early intervention programs) at 5.4%.

Table 2: *Distribution of Anthropometric and Hematologic Parameters*

Variable	Median	IQR
Weight (kg)	35.47	16.00
Height (m)	01.38	0.38
BMI (kg/m2)	16.59	02.78
PCV	34.00	06.00

The median body mass index (BMI) was 16.59 kg/m2 (IQR = 02.78). This highlights generally low body mass for age in the study population.

Table 3: *Nutritional Status of Pupils of Special School Lafia by Z-score*

Variable	Frequency	Percentage
Wasting (WHZ) *(n=260)*	148	56.90
Normal ≥ –2 SD	112	43.10
Moderate Acute Malnutrition (MAM) <-2D to ≥-3SD	74	28.50
Severe Acute Malnutrition (SAM) <-3SD	74	28.50
Underweight (WAZ) *(n=74) children ≤10 yrs*	30	40.50
Normal (> –2 SD)	44	59.50
Underweight (< –2 SD)	16	21.60
Severe Underweight (< –3 SD)	14	18.90
Stunting (HAZ) *(n=260)*	51	19.60
Normal (≥–2 SD)	209	80.40
Stunted (< –2 SD to ≥ –3 SD)	51	19.60
Severe Stunting (<-3SD)	0	00.00

Table 4: *Prevalence of Anemia among Pupils of Special School Lafia (n=260)*

Variable	Frequency	Percentage
Normal	200	76.90
Anemia	60	23.10

Table 5: *Prevalence of Parasitic Infection among Pupils of Special School Lafia(n=158)*

Variable	Frequency	Percentage
Present	110	69.60
Absent	48	30.40

Table 6: *Distribution of Parasitic Infection among Pupils of Special School Lafia (n=110)*

Variable	Frequency	Percentage
Ascaris Lumbricoides	89	80.90
E. Histolytica	13	11.80
Mixed	05	04.50
Trichuris Trichura	02	01.80
Tapeworm	01	00.90

Table 7: *Socio-Demographic distribution of Hemoglobin parameters among Pupils of Special School Lafia*

Variable	Anemia	Normal	Chi-square	p-value
Age			12.92	0.001*
5-9	23 (40.40)	34 (59.60)		
10-14	21 (20.60)	81 (79.40)		
15-19	16 (15.80)	85 (84.20)		
Sex			145	0.76
Male	38 (22.40)	132 (77.60)		
Female	22 (24.40)	68 (75.60)		
Type of Disability			FE=7.34	0.057
Hearing impaired	46 (26.60)	127 (73.40)		
Visual Impaired	02 (09.50)	19 (90.50)		
Learning Impaired	07 (13.50)	45 (86.50)		
Early Intervention	05 (35.70)	09 (64.30)		

A statistically significant association between age and anemia status (χ^2 = 12.92, p = 0.001), with anemia being more prevalent among younger pupils (5–9 years).

Table 8: *Socio-Demographic distribution of Parasitic Infection among Pupils of Special School Lafia*

Variable	Present	Absent	Chi-square	p-value
Age			0.44	0.795
5-9	17 (73.90)	06 (26.10)		
10-14	47 (67.10)	23 (32.90)		
15-19	46 (70.80)	19 (29.20)		
Sex			0.001	1
Male	69 (69.70)	30 (30.30)		
Female	41 (69.50)	18 (30.50)		
Type of Disability			FE=16.83	<0.001*
Hearing impaired	82 (70.10)	35 (29.90)		
Visual Impaired	03 (23.10)	10 (76.90)		
Learning Impaired	20 (87.00)	03 (13.00)		
Early Intervention	05 (100.00)	00 (00.00)		

Parasitic infection was significantly associated with type of disability (Fisher's Exact = 16.83, p < 0.001), with higher prevalence among pupils with learning impairment and those enrolled in early intervention programs.

Table 9: *Binary Logistic Regression for Wasting among pupils of Special school Lafia*

Variable	AOR	95% CI	p-value
Age group (Ref: 5–9 years)	1		
10-14 years	0.68	0.24 – 1.96	0.478
15-19 years	0.90	0.31 – 2.62	0.847
Sex (Ref: Male)	1		
Female	2.01	1.00 – 4.02	0.049*
Disability Type (Ref: Hearing Impaired)	1		
Learning impaired	0.84	0.32-2.16	0.709
Visual impaired	2.36	0.64-8.75	0.198
Early intervention	2.71	0.26-28.46	0.406
PCV (Ref: Normal)	1		

DISCUSSION

Findings from this study showed that most of the pupils were between 10-19 years and that the population had more boys than girls. This finding differs from result of a study in Delta state Nigeria where more than half (53.7%) of the respondents were females while 46.3% were males. [15] This difference from the study in Delta could be due to regional difference in school enrollment for boys and girls or simply a random occurrence. To ensure inclusivity in education and access to life opportunities both sexes require equal access to education.

Among the different forms of disabilities in the study population. hearing impairment was the most prevalent form of disability, affecting about two-thirds of the population. This finding agrees with the finding from a north central study on the patterns of disabilities among students in special needs schools where it was found that hearing impairment was the most commonly occurring disability among the students while learning impairment was the least occurring disability [16] being in the same country, common aetiological factors for hearing impairment may account for this similarity. As observed from a hospital-based study in Ekiti state Nigeria, the aetiologic factors of hearing impairment include neonatal jaundice, febrile illness, otitis media and birth asphyxia. [17] These factors do not only lead to hearing impairment but also other forms of disability such as learning disability. Hearing impairment has both social and economic consequences not only on the affected child but also the family and the society. This calls attention to a health

system that is responsive enough to tackle these risk factors in the community.

Findings from this study also indicated that less than one-third of the pupils were stunted, about half of the pupils were found to be wasted while nearly one-third of the pupils were under-weight. Comparing these findings to the findings among children without disability across different regions in Nigerian between 2018-2023, a scoping review showed that stunting remained alarmingly high ranging from 7.2% (Osun, South West) to 61% (Kaduna, West), while wasting varied from 1% (Ibadan, South West) to 29% (FCT Abuja, Central) and underweight from 5.9% (Osun, South West) to 42.6% (Kano, North West) respectively. [13] The finding among the disabled students in this study fits the regional finding among in the general population.

Recent national surveys showed that the nutritional status of children under age 5 has not greatly improved in the past 5 years. In 2018, 37% of children under age 5 were stunted, 7% were wasted, 22% were underweight, and 2% were overweight, as compared with 40%, 8%, 27%, and 1%, respectively, in 2023–24. [18] The prevalence of stunting, wasting and underweight were 35.0, 9.6 and 22.9 respectively. [18]

Children with special needs are said to have unique challenges that predispose them to nutritional deficiencies. These include; excessive salivation, frequent constipation, inability to feed oneself, depending on care givers for feeding, food dropping from the mouth while being fed and difficulty in chewing and swallowing foods. [19] Hence it is observed that, children with disabilities were more likely to be stunted, wasted and underweight than children without disabilities. [4] In different low- and middle-income countries (LMICs), it has been observed that children with disabilities were almost three times more likely to be underweight and nearly twice as likely to experience stunting and wasting compared to controls. [5] A similar finding was observed in South East Asia where it was found that children with disability had 1.30

times and 1.17 to 1.39 times higher likelihoods of adverse health outcomes and anthropometric deficits, [20]

It is of great public health importance to pay additional attention to the nutrition of the children with disabilities.

Less than half of the pupils in this study were anaemic with majority of them having mild anaemia (PCV of 21-30%). The finding in this study is rather lower compared to the finding among children in the general population where prevalence of anemia ranged between 55.2 to 75.1 %. [13] This difference could be due to the presence of school feeding program among the studied population. If this observation is correct, it emphasizes the need to sustain and improve school feeding program not only among children with special needs but also in the general population. Age was found to have a statistically significant association with haemoglobin levels (X^2=12.92; p=0.001). However, upon multivariate analysis, age was not a predictor of having anaemia.

This study found that slightly above two-thirds of the pupils had parasitic infections of which the most prevalent organism identified was Ascaris Lumbricoides. Disability type was found to have statistically significant association with having parasitic infection (X^2=16.83; p= 0.001).

CONCLUSION

This study investigated the Health and Nutritional Profile of Children with Disabilities Attending Special School in Lafia, Nasarawa State using anthropometric parameters, hematology and fecal sample examination. The findings showed that there was a statistical association between age and anemia with anemia being more prevalent among younger pupils (5-9yrs). Parasitic infection was also significantly associated with type of disability with higher prevalence amongst pupils with learning impairment. This therefore implies that there is need for great attention to the nutrition of children with disabilities.

Declaration by Authors

This manuscript has been read and approved by the authors and the requirements for authorship have been met by all authors. The authors agree that the manuscript represents the work done by all.

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