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Research Article

Nutritional status and functional capacity of physically challenged adolescents attending school of students with special needs in Ilaro, Nigeria

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Highlights/Key Messages

- Stunting affected 68% of disabled adolescents despite near-normal BMI in many.
- Vitamin C, calcium, and folate intakes were critically low across all groups.
- Females and older males faced the greatest micronutrient deficiency burden.
- Only 30% achieved independence in complex daily living activities.
- Disability type determined functional capacity more than nutritional status did.

Background
Physically challenged adolescents face compounding barriers that impair nutritional status, functional independence, and overall quality of life. Despite the growing recognition of these challenges, empirical evidence from special needs schools in Nigeria remains sparse.

Objective
This study assessed the nutritional status and functional capacity of physically challenged adolescents attending the School of Students with Special Needs in Ilaro, Nigeria.

Methods
A cross-sectional descriptive study was conducted among all 111 physically challenged adolescent students in school at Yewa College. Socio-demographic and economic data were collected via structured interviews. Nutritional status was assessed through standardised anthropometric measurements and dietary assessment was conducted via a single multiple-pass 24-hour dietary recall. Functional capacity was evaluated using the Bristol Activities of Daily Living Scale (BADL) and the Lawton and Brody Instrumental Activities of Daily Living Scale (IADL). Data were analysed with SPSS version 26.0 using descriptive statistics and chi-square tests.

Results
The majority of respondents were male (56.8%), and over half (53.2%) had concurrent hearing and speech impairment. While 45.0% had a normal BMI-for-age, stunting prevalence was high at 68.0%. Energy and fat intakes were below the RDA across all age-sex groups, whereas protein, carbohydrate, vitamin A, iron, and zinc were adequate or exceeded recommended levels. Critical deficiencies were observed in vitamin C, calcium, folate, potassium, magnesium, and B-complex vitamins, with the most severe deficits in females and late adolescent males. Functional independence was high in BADL (72.1%) but markedly low in IADL (30.0%), with greatest dependence in food shopping (50.5%), cash handling (43.2%), and laundry (42.3%). Disability type was significantly associated with functional capacity in both BADL and IADL domains ($p < 0.05$).

Conclusion
Physically challenged adolescents in this study demonstrated a dual burden characterised by pervasive micronutrient deficiencies, high stunting prevalence, and substantial IADL dependency, with disability type as the primary determinant of functional capacity

Keywords: adolescent; functional capacity; nutritional status; physical disability; Nigeria

Introduction

Physical disability is a complex, multidimensional condition that arises from the interaction between an individual's impairment and a range of attitudinal, institutional, and environmental barriers that restrict full participation in society (United Nations General Assembly, 2006). It is not solely a medical problem; rather, it reflects the dynamic interplay between personal impairments, whether physical, sensory, intellectual, or cognitive and the socio-environmental context in which an individual lives. Disabilities may be congenital or acquired through illness, injury, or other factors, and they frequently impose significant limitations on functional capacity, mobility, stamina, and independence (WHO, 2025).

Globally, over one billion people live with some form of disability, with a disproportionate burden concentrated in low- and middle-income countries (WHO, 2023). In Nigeria and other sub-Saharan African settings, adolescents with physical disabilities face layered vulnerabilities: they are more likely to experience food insecurity, lack access to safe water and sanitation, and report poorer overall health and nutritional status compared to their non-disabled peers (Kuper et al., 2014). WHO (2023) has noted that persons with disabilities confront substantially elevated risks of undernutrition, compounding the existing inequities they face in health and education systems.

Adequate nutrition is particularly critical during adolescence, a period characterised by rapid physical growth, sexual maturation, and cognitive development. However, adolescents with physical disabilities often face barriers that impede optimal dietary intake. Many depend on caregivers for fundamental activities such as eating, dressing, and bathing, and inadequate caregiver knowledge of disability-specific nutritional requirements can heighten the risk of malnutrition (UNICEF, 2024). Beyond caregiver capacity, disability-related limitations in strength, dexterity, and mobility can compromise the ability to prepare nutritious meals, resulting in both quantitative and qualitative dietary inadequacies (Kuper et al., 2014). Social restrictions further compound these challenges, as disability frequently curtails community participation and limits opportunities for independent living.

In peri-urban sub-Saharan African contexts, poor dietary habits and micronutrient deficiencies have been associated with stunting, underweight, overweight, and obesity among adolescent populations, including in Nigeria (Ademiluyi et al., 2025). A dual burden of malnutrition is increasingly documented among Nigerian adolescents in general, where nutrient-deficient diets coexist with excess intake of specific macronutrients, and where socioeconomic privilege mediates dietary risk, with overweight and obesity more prevalent among adolescents attending private schools, and stunting and thinness more common in public and resource-limited settings (Ademiluyi et al., 2025; Sodiya et al., 2026). These patterns are likely exacerbated among adolescents with disabilities, who face additional structural barriers to accessing adequate and diverse diets.

Functional capacity is the ability to perform tasks essential for independent living, a major determinant of quality of life, and is commonly classified into Basic Activities of Daily Living (BADL) and Instrumental Activities of Daily Living (IADL) (Adepoju et al., 2021). BADLs encompass fundamental self-care tasks such as eating, drinking, and dressing, while IADLs involve more complex skills required for community-level independence, including cooking, shopping, managing finances, and using communication devices.

The relationship between physical disability, nutritional status, and functional capacity is bidirectional and mutually reinforcing. Physical disability can restrict mobility, hand function, and independent access to food while increasing reliance on caregivers for meal preparation and feeding, thereby elevating the risk of dietary inadequacy and malnutrition (Kuper et al., 2014; UNICEF, 2024). Conversely, poor nutrition, including undernutrition, micronutrient deficiencies, overweight, and obesity, can worsen muscle weakness, impair cognitive and physical development, and further limit the ability to perform both basic and instrumental activities of daily living (WHO, 2023; Adepoju et al., 2021). Reduced functional capacity, in turn, may decrease participation in school, recreation, and social life, contributing to dependency, exclusion, and poorer overall well-being (Zietz et al., 2018; Greaux et al., 2024). Adolescents with physical disabilities are also disproportionately exposed to violence, neglect, and abuse, and face substantial barriers to healthcare access, chronic hunger, low self-esteem, and restricted employment prospects, all of which negatively affect long-term quality of life (Groce & Kett, 2013).

Despite the recognised interplay between disability, nutrition, and functional independence, data on physically challenged adolescents attending special needs schools in southwest Nigeria remain scarce. Such schools represent some of the most concentrated and accessible points for nutritional surveillance, functional assessment, and targeted intervention among adolescents with disabilities. To address this knowledge gap, the present study assessed the nutritional status and functional capacity of physically challenged adolescents attending the School of Students with Special Needs in Ilaro, Nigeria.

Methods

Study Area

The study was conducted in the headquarters (Ilaro town) of Yewa South Local Government of Ogun State, Nigeria. The town is about one hundred (100) kilometres (km) from Lagos State capital (Ikeja) and about fifty (50) km from Abeokuta, the Ogun State capital. Ilaro town is situated in the southwest region of Nigeria, and its inhabitants are mainly Yoruba with various dialects, including Yewa, Anago, and Egun. This study was carried out from September through December 2024.

Study Design and Sampling

The study adopted a cross-sectional, descriptive research design and included all eligible, available, physically challenged students enrolled in the School of Students with Special Needs in Ilaro and its annex at Yewa College. Physical disability in this study encompasses sensory (hearing, visual, speech), motor (mobility impairment), and cognitive (intellectual/mental) impairments, as classified in the school's enrolment records and consistent with the WHO International Classification of Functioning, Disability and

Health framework (WHO, 2025).

Eligible participants were students aged 10–19 years who were formally enrolled in the school, had a diagnosed physical disability, and whose parents or guardians provided informed consent. Students who were acutely ill during data collection or whose caregivers declined consent were excluded from the study.

Regarding living arrangements and food access, most students were day students residing at home with families or caregivers, while a smaller proportion were boarders. Day students received at least one school-provided meal on school days, typically a single mid-day meal; weekend and holiday meals were entirely dependent on household provision. Boarding students had meals provided in school throughout the week. Neither day nor boarding students had routine access to independent cooking facilities within the school setting. Food purchasing and preparation were therefore largely the responsibility of caregivers and school food service staff rather than the students themselves. Transportation between home and school was primarily by caregiver escort or school-arranged conveyance, and independent community mobility for food procurement was not routinely available to these students.

Data Collection

An interview schedule containing both structured and unstructured questions was used in data collection. The dietary recall data were collected during a defined period in the dry season (January–April 2024), when fruit and vegetable availability in Yewa South LGA is seasonally limited, and prices are relatively elevated. The research schedule comprised three parts: socio-demographic and economic characteristics of the respondents; the respondents' nutritional status; and the respondents' functional capacity.

Weight was measured using a calibrated, pre-tested weighing scale, with participants standing upright and both arms at their sides; values were recorded to the nearest 0.1 kg. Height was measured using a standardised locally constructed stadiometer and recorded to the nearest metre (m). Body mass index (BMI) was subsequently calculated as weight (kg)/height (m^2). BMI-for-age Z-scores were interpreted using WHO reference cut-offs: severe thinness (< −3 SD), thinness (−3 SD to < −2 SD), normal weight (−2 SD to +1 SD), overweight (> +1 SD to +2 SD), and obesity (> +2 SD) (WHO, 2007).

Nutrient intake was obtained using a single 24-hour dietary recall questionnaire using the multiple-pass method. Food quantities reported in the 24-hour dietary recall were converted to nutrient values using the West African Food Composition Table and, where necessary, supplemented with the USDA National Nutrient Database (https://fdc.nal.usda.gov). Total daily nutrient intakes were calculated for each participant, and median intakes were computed by age-sex group.

Functional capacity of the respondents was assessed using the Basic Activities of Daily Living (BADL) scale, specifically the Bristol Activities of Daily Living Scale (Bucks et al., 1996), and the Instrumental Activities of Daily Living (IADL) scale, specifically the Lawton and Brody Instrumental Activities of Daily Living Scale (Lawton and Brody, 1969). The BADL scale assessed functional capacity for performing routine self-care activities such as dressing, bathing, and eating, while the IADL scale assessed activities requiring organisation and planning, including shopping, meal preparation, housekeeping, financial management, telephone use, and transportation. Although both scales were originally developed for older adult populations, they were adapted for younger populations with disabilities in this study. The instruments were reviewed for age-appropriateness, and minor contextual modifications were made to reflect activities relevant to school-aged adolescents in the study setting. Data collectors received structured training prior to administration, and pilot testing was conducted to ensure internal consistency (Cronbach's alpha > 0.70).

Scoring of the Functional Capacity Questionnaires

For better interpretation and analysis, scoring of these instruments was performed by categorising results into levels of functional impairment using the Johnson et al. (2004) functional impairment formula. Questions on both were divided into five (5) sections addressing various activities; each section had three to six items, and each item was rated on a 4-point scale from zero to three. Individuals with no difficulty in performing a particular activity were scored zero, while those with difficulties were scored one or two based on the severity of their impairment, and those no longer capable of performing an activity were scored three. Using the Johnson et al. (2004) functional impairment formula, the total score of each respondent in both BADL and IADL ranged between zero and 100.

Functional impairment = (Sum of all ratings) / (3 × Total number of rated items) × 100

The resulting score was used to categorise severity of impairment. Respondents who scored 0–33% were rated as unimpaired or mildly impaired, those who scored 34–66% were rated as moderately impaired, and those who scored above 66% were rated as severely functionally impaired. Respondents with moderate and severe functional impairment were classified as functionally dependent, while those with no or mild functional impairment were classified as functionally independent.

Data Analysis

Data obtained in the present study were analysed using the Statistical Package for Social Sciences (SPSS) version 26.0. WHO AnthroPlus was used to generate the Z-score data for BMI-for-age and height-for-age. Dietary intake data were analysed and converted into nutrient intake using Nutri-survey software in conjunction with the Nigerian Food Composition Database. Descriptive statistics, including frequencies, percentage distributions, means, and standard deviations, were used to present the results. Inferential

statistics, including the chi-square test, were used to determine the association between categorical variables.

Ethical Considerations

Ethical approval for this study was obtained from the Federal Polytechnic Ilaro Research Ethics Committee (Protocol Approval Number: FPIREC/218/2023/111). Written informed consent was obtained from parents or legal guardians of all participants prior to data collection. Assent was also obtained from participants who were able to communicate their willingness to participate. Permission to conduct the study was granted by the school administration. All data were handled confidentially and used strictly for research purposes. Summary nutrition findings were communicated to the school administration and the responsible caregivers through a debriefing session conducted by the research team.

Results

Sociodemographic Characteristics

Table 1 presents the socio-demographic and economic characteristics of the physically challenged adolescents attending the School of Students with Special Needs in Ilaro. More than half of the respondents were male (56.8%), and the majority (51.4%) were between 15 and 19 years of age. Most respondents (62.2%) were Christian. More than half (53.2%) had concurrent hearing and speech impairment (speech and hearing impairment), 18.0% had cognitive impairment, 8.1% had hearing impairment alone, 10.8% had speech impairment alone, 1.8% had visual impairment, and 8.1% had other forms of physical disabilities.

Table 1. Sociodemographic characteristics of the respondents

Variable	Frequency	Percentage (%)
Gender		
Male	63	56.8
Female	48	43.2
Age (years)		
10–14	54	48.6
15–19	57	51.4
Religion		
Christianity	69	62.2
Islam	42	37.8
Type of disability		
Cognitive impairment	20	18.0
Speech and hearing impairment	59	53.2
Hearing impairment	9	8.1
Speech impairment	12	10.8
Visual impairment	2	1.8
Physical/Mobility impairment	9	8.1
School class		
Basic 1–3	36	32.4
Basic 4–6	23	25.2
JSS 1–3 (Junior secondary school)	20	18.0
SSS 1–3 (Senior secondary school)	27	24.3

BMI-for-Age and Height-for-Age of Respondents

Using the anthropometric measurements, BMI-for-age and height-for-age Z-scores were computed and presented in Figures 1 and 2. They indicate that thinness and overweight are minor problems, whereas nutritional stunting is a major problem in this sample.

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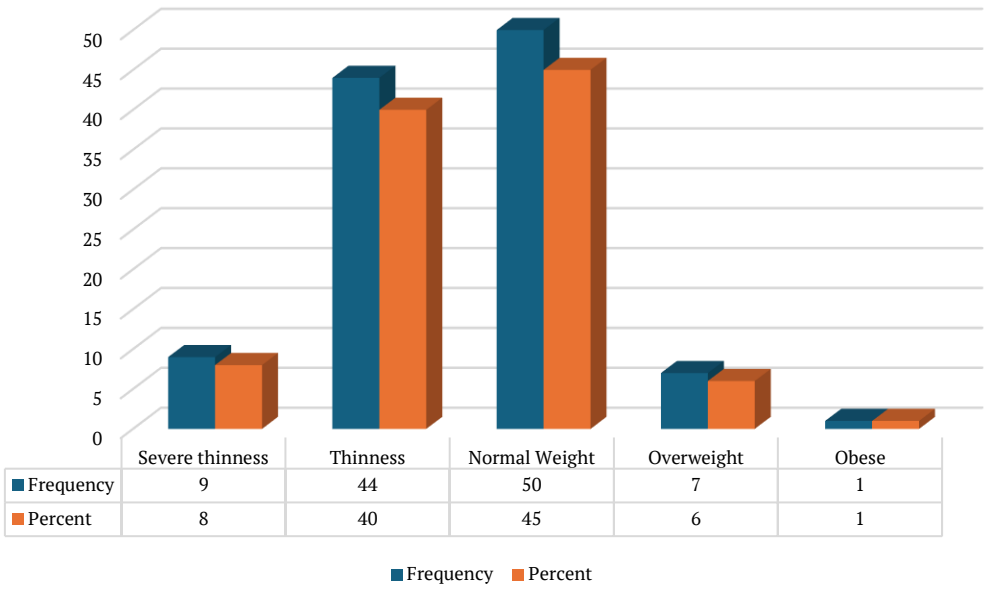


Figure 1. Percentage distribution of the BMI-for-age of the respondents

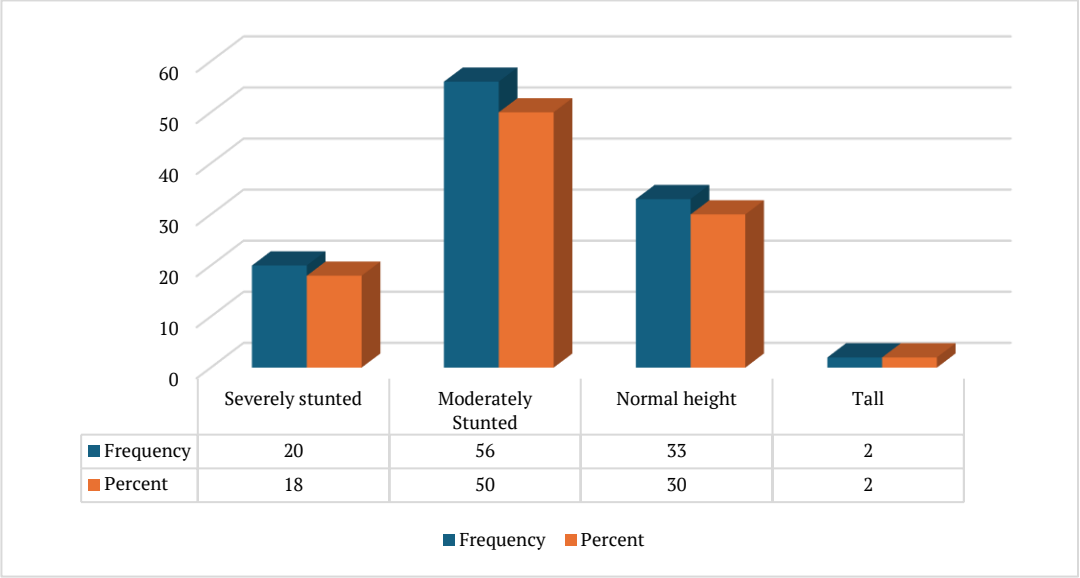


Figure 2. Percentage distribution of height-for-age Z scores of the respondents

Median Nutrient Intake of Respondents by Age and Gender

Table 2 provides detailed median nutrient intake values by age-sex group. It reveals a complex dietary profile characterised by caloric insufficiency, selective macronutrient excess, and widespread micronutrient deficiency. Energy intake fell below the RDA in all age-sex groups, with early adolescent females most deficient (72.8% of RDA). Protein was the only macronutrient that met or exceeded the RDA across all groups (136.3%–241.2%), while carbohydrate intake was markedly excessive (>210% of the RDA across all groups). Fat and dietary fibre were consistently inadequate (64.4%–86.7% and 57.1%–64.9% of RDA, respectively). Vitamin A was strikingly elevated across all groups (1,045.7%–2,003.8% of RDA), whereas vitamin C was virtually absent (<0.3% of RDA). Calcium was the most uniformly severe mineral deficit (~10–11% of RDA), and folate was critically low in all groups (7.5%–23.3% of RDA). A notable sex disparity emerged among early adolescents: males met or exceeded the RDAs for vitamins B1, B2, B3, and B12, whereas females of the same age were severely deficient in all four. Late adolescents of both sexes showed broad B-vitamin insufficiency. Iron and zinc exceeded the RDA across all groups, though bioavailability limitations temper their nutritional significance.

Functional Capacity of Respondents

The ability of each respondent to perform Basic Activities of Daily Living (BADL) and Instrumental Activities of Daily Living (IADL) was assessed. The majority of respondents (72.1%) were functionally independent in basic activities of daily living, while 18.9% and 9.0% were moderately and severely impaired, respectively. Less than one third (30.0%) of respondents were functionally independent in instrumental activities of daily living, while 39.0% and 31.0% were moderately and severely impaired, respectively (Figure 3).

Among the BADL domains, 30.6% of respondents were functionally dependent in dressing, 25.0% in drinking, and 26.1% in eating (Figure 4). In IADL domains, the highest rates of functional dependency were observed in food shopping (50.5%), handling cash (43.2%), laundry (42.3%), housekeeping (39.6%), mobility (38.7%), food preparation (28.8%), understanding (21.6%), talking (20.7%), and telephone usage (14.4%) (Figure 5).

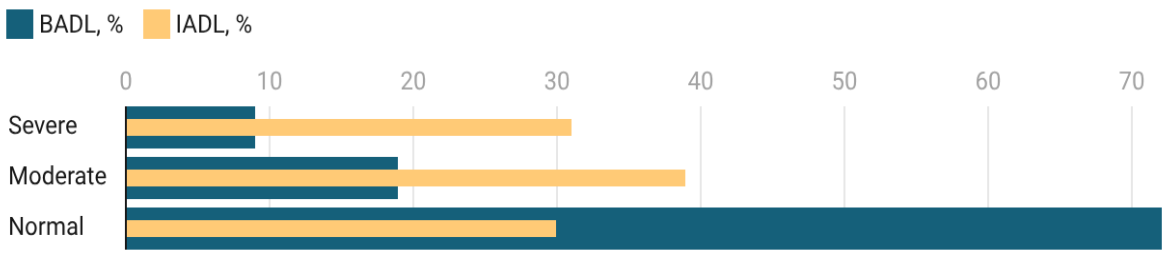


Figure 3. Functional capacity classification

Table 2. Median nutrient intake of physically challenged adolescents by age group and sex

Nutrient	Unit	Early Adolescence (10–14 years)						Late Adolescence (15–19 years)					
		Female (n=26)			Male (n=28)			Female (n=22)			Male (n=35)		
		Median	RDA[a]	%RDA	Median	RDA[a]	%RDA	Median	RDA[a]	%RDA	Median	RDA[a]	%RDA
Calories	kcal	1600	2200	72.8	2100	2500	83.9	2120	2200	96.3	2180	3000	72.8
Protein	g	49	34	144	82	34	241	64	46	138	76	56	136
Carbohydrate	g	274	130	211	348	130	268	310	130	239	379	130	291
Fat	g	47	73	64.4	72	83	86.7	58	73	79.5	73	100	73.0
Fibre	g	18	30.8	58.4	22	35	62.9	20	30.8	64.9	24	42	57.1
Vitamin A	mcg	10,800	600	1800	6860	600	1140	14,000	700	2000	10,500	1000	1050
Vitamin C	mg	0.12	45	0.3	0.00	45	0.0	0.10	75	0.1	0.00	90	0.0
Vitamin B1	mg	0.21	0.90	23.3	2.10	0.90	233	0.19	1.10	16.9	0.82	1.20	68.7
Vitamin B2	mg	0.19	0.90	21.1	1.19	0.90	132	0.17	1.10	15.0	0.48	1.30	36.9
Vitamin B3	mg	1.77	12	14.8	19.2	12	160	1.53	14	10.9	7.79	16	48.7
Vitamin B6	mg	0.02	1.0	2.0	0.59	1.0	59.0	0.02	1.30	1.3	0.25	1.30	19.3
Folate (B9)	mcg	37	300	12.3	70	300	23.3	32	400	8.0	30	400	7.5
Vitamin B12	mcg	0.05	1.80	2.8	2.06	1.80	114	0.04	2.40	1.8	0.79	2.40	32.9
Calcium	mg	137	1300	10.5	145	1300	11.2	130	1300	10.0	132	1300	10.1
Phosphorus	mg	98	1250	7.8	733	1250	58.6	51	1250	4.0	332	1250	26.6
Potassium	mg	263	4500	5.8	101	4500	2.2	158	4700	3.4	134	4700	2.8
Sodium	mg	40	1500	2.7	268	1500	17.9	72	1,500	4.8	164	1500	10.9
Zinc	mg	29	8	363	19	8	238	26	9	284	16	11	150
Iron	mg	83	8	1,040	46	8	575	61	15	409	31	11	281
Magnesium	mg	52	240	21.7	171	240	71.3	85	360	23.6	108	410	26.3

[a] Source: Food and Nutrition Board, Institute of Medicine, National Academies (2000, 2005, 2011).
Note: All values are rounded to a maximum of three significant figures.

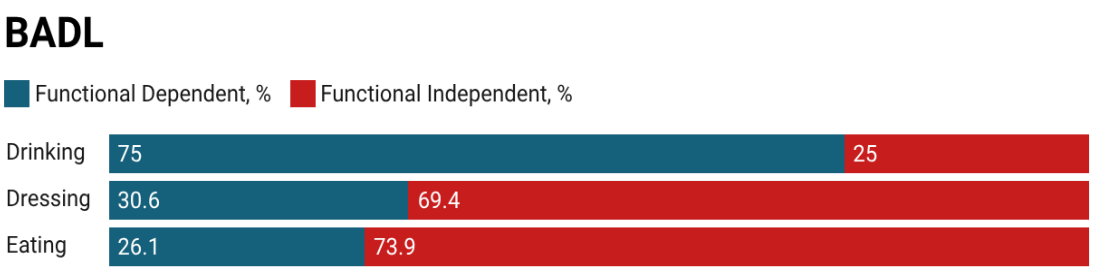


Figure 4. Functional capacity of the respondents in basic activities of daily living (BADL)

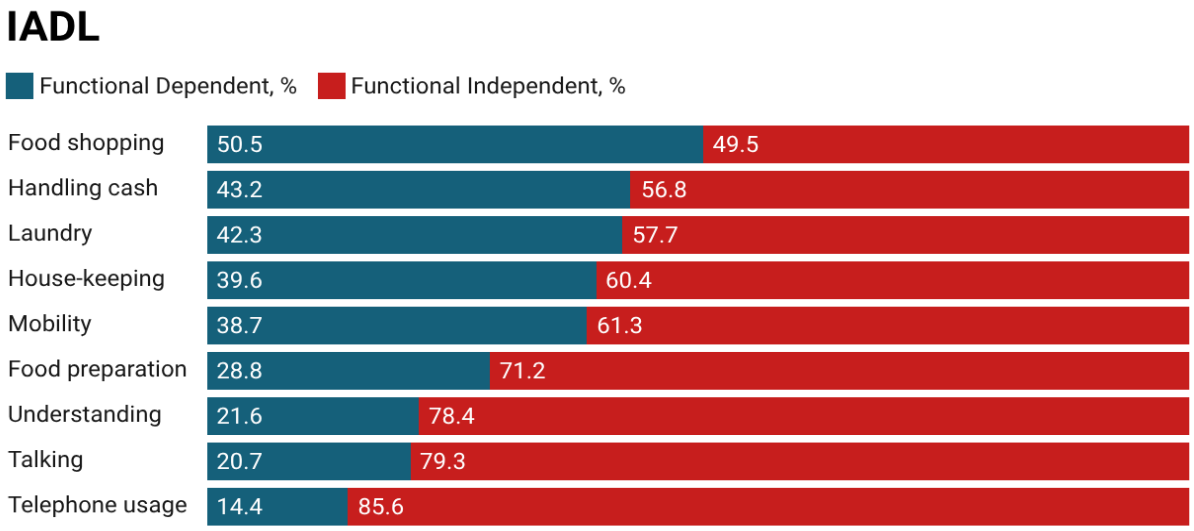


Figure 5. Functional capacity in instrumental activities of daily living (IADL)

Association between Functional Capacity and Types of Disabilities

A significant association ($p < 0.05$) was observed between functional capacity in basic activities of daily living (eating, drinking, and dressing) and disability type. Functional capacity in instrumental activities of daily living, including food preparation, housekeeping, telephone usage, talking, and understanding, was also significantly associated with disability type ($p < 0.05$), as presented in Tables 3 and 4.

Association between level of functional impairment and Height for Age

As shown in Table 6, there was no statistically significant association between level of functional impairment and height-for-age z-score categories among respondents. Although varying proportions of normal height-for-age and stunting categories were observed across functional impairment levels, these differences were not statistically significant. Refer to Table 6 for detailed distribution of percentages and frequencies.

Table 3. Association between functional capacity and types of disabilities, n (%)

Functional Capacity	Types of Disabilities						χ^2	p-value
	Cognitive impairment	Hearing and Speech impairment	Hearing impairment	Speech impairment	Visual impairment	Physically challenged		
Eating								
Functionally independent	13(65.0)	48(81.4)	6(66.7)	11(91.7)	0(0.0)	4(44.4)	14.43	0.01*
Functionally dependent	7(35.0)	11(18.6)	3(33.3)	1(8.3)	2(100)	5(55.6)		
Drinking								
Functionally Independent	14(70.0)	48(81.4)	6(66.7)	11(91.7)	0(0.0)	4(44.4)	14.04	0.02*
Functionally dependent	6(30.0)	11(18.6)	3(33.3)	1(8.3)	2(100)	5(55.6)		
Dressing								
Functionally Independent	13(65.0)	47(79.7)	6(66.7)	10(83.3)	0(0.0)	1(11.1)	23.16	0.00*
Functionally dependent	7(35.0)	12(20.3)	3(33.3)	2(16.7)	2(100)	8(88.9)		
Food preparation								
Functionally independent	13(65.0)	16(27.1)	1(11.1)	2(16.7)	0(0.0)	0(0.0)	19.54	0.00*
Functionally dependent	7(35.0)	43(72.9)	8(88.9)	12(83.3)	2(100)	9(100)		
House keeping								
Functionally independent	12(60.0)	21(35.6)	5(55.6)	6(50.0)	0(0.0)	0(0.0)	12.58	0.03*
Functionally dependent	8(40.0)	38(64.4)	4(44.4)	6(50.0)	2(100)	9(100)		
Laundry								
Functionally independent	11(55.0)	26(44.1)	4(44.4)	6(50.0)	0(0.0)	0(0.0)	9.767	0.08
Functionally dependent	9(45.0)	33(55.9)	5(55.6)	6(50.0)	2(100.0)	9(100.0)		

Table 4. Association between functional capacity and types of disabilities, n (%)

Functional Capacity	Types of Disabilities						χ^2	p-value
	Cognitive impairment	Hearing impairment and Speech impairment	Hearing impairment	Speech impairment	Visual impairment	Physically challenged		
Handling cash								
Functionally independent	11(55.0)	24(40.7)	5(55.6)	7(58.3)	0(0.0)	1(11.1)	8.26	0.14
Functionally Dependent	9(45.0)	35(59.3)	4(44.4)	5(41.7)	2(100)	8(88.9)		
Food shopping								
Functionally independent	13(65.0)	29(49.2)	5(55.6)	8(66.7)	0(0.0)	1(11.1)	10.70	0.05
Functionally dependent	7(35.0)	30(50.8)	4(44.4)	4(33.3)	2(100.0)	8(88.9)		
Telephone usage								
Functionally independent	9(45.0)	1(1.7)	0(0.0)	0(0.0)	1(50.0)	5(55.6)	40.84	0.00*
Functionally dependent	11(55.0)	58(98.3)	9(100)	12(100.0)	1(50.0)	4(44.4)		
Talking								
Functionally independent	8(40.0)	6(10.2)	0(0.0)	1(8.3)	2(100)	6(66.7)	31.21	0.00*
Functionally dependent	12(60.0)	53(89.8)	9(100)	11(91.7)	0(0.0)	3(33.3)		
Understanding								
Functionally independent	10(50.0)	1(1.7)	0(0.0)	6(50.0)	2(100.0)	5(55.6)	44.87	0.00*
Functionally dependent	10(50.0)	58(98.3)	9(100.0)	6(50.0)	0(0.0)	4(44.4)		
Mobility around								
Functionally independent	9(45.0)	22(37.3)	7(77.8)	4(33.3)	0(0.0)	1(11.1)	10.47	0.06
Functionally dependent	11(55.0)	37(62.7)	2(22.2)	8(66.7)	2(100.0)	8(88.9)		

* Significant at p<0.05.

Table 6. Association between level of functional impairment and height for age

Level of functional impairment	Height for age z score categorization n (%)				χ^2	p-value
	Normal	Mildly stunted	Moderately stunted	Severely stunted		
Basic activities of daily living (BADL)						
Normal	24(30.0)	22(27.5)	18(22.5)	14(17.5)	3.32	0.97
Mildly functionally dependent	5(23.8)	6(28.6)	5(23.8)	5(23.8)		
Severely functionally dependent	4(40.0)	4(40.0)	1(10.0)	1(10.0)		
Instrumental activities of daily living (IADL)						
Normal	13(38.2)	10(29.4)	4(11.8)	6(17.6)	11.17	0.35
Mildly functional dependents	10(23.3)	14(32.6)	13(30.2)	5(11.6)		
Severely functional dependents	10(29.4)	8(23.5)	7(20.6)	9(26.5)		

Discussion

The findings of this study offer important insights into the demographic profile, nutritional status, functional capacity, and dietary intake patterns of adolescents with physical disabilities enrolled in a special needs school in southwest Nigeria. A slight male predominance was observed (56.8%), consistent with findings by Ofole (2022), who reported a 57% male proportion among adolescents in Ibadan. The majority of respondents (51.4%) were within the 15–19-year age bracket. Religious affiliation showed that 62.2% were Christians and 37.8% were Muslims, reflecting trends previously documented by Jesuleye (2024) in Oyo town.

Regarding disability type, speech and hearing impairment was the most prevalent condition, accounting for 53.2% of respondents, followed by cognitive impairment at 18.0%. This corroborates findings by Bilqis et al. (2023), who identified hearing impairment as the most prevalent disability in special schools in resource-limited settings. Mbada et al. (2020) similarly noted hearing, speech, and cognitive disabilities as predominant, though with lower reported percentages, a variation attributable to differences in referral patterns, since schools like those in the present study may disproportionately accommodate more severe and complex disability presentations.

Anthropometric analysis revealed a significant difference in weight across age groups ($p < 0.05$), consistent with findings of Adeomi et al. (2021), Uthman-Akinhanmi et al. (2024), and Olatona et al. (2023), all of whom reported progressive increases in mean body weight among older adolescents, reflecting the expected trajectory of body mass accrual during puberty. Anthropometric assessment showed that 45.0% of respondents had a normal BMI-for-age, while approximately half experienced varying degrees of thinness, and only a small proportion were overweight or obese. High rates of thinness are consistent with findings from Adamu et al. (2018), who reported elevated underweight and wasting levels among adolescents with cerebral palsy in Kano, and with Badaru et al. (2023), who associated malnutrition and low body weight with reduced functional capacity.

Stunting prevalence was high at 68.0%, comprising 50.0% moderately stunted and 18.0% severely stunted, corroborating Ibeh et al. (2024), who found stunting to be strongly associated with motor severity in physically challenged adolescents. Given the well-established long-term consequences of adolescent undernutrition on health, reproductive outcomes, and productivity (Olatona et al., 2023), these findings highlight the heightened vulnerability of this population to chronic malnutrition and growth faltering.

Functional capacity assessment revealed that 72.1% of respondents were functionally independent in basic activities of daily living (BADL), with moderate and severe impairment in 18.9% and 9.0%, respectively. BADL performance varied significantly by disability type ($p < 0.05$), with eating, drinking, and dressing showing significant associations with disability type. Most respondents were functionally independent in eating; however, visually impaired respondents demonstrated complete dependence across all BADL domains. Physically and cognitively impaired respondents also showed higher rates of dependence, consistent with Caramico-Favero et al. (2018), who linked dysphagia, muscle weakness, and neuromotor impairment to BADL limitations in children with cerebral palsy. The total dependence among visually impaired respondents aligns with Bonsaksen et al. (2025), who documented lower quality of life and higher dependency levels among adults with visual impairment.

BADLs can often be maintained with appropriate caregiver assistance; however, functional independence is best supported through targeted interventions such as adaptive feeding techniques, occupational therapy, and personalised training in self-care tasks, as recommended by Swai et al. (2024), Turan et al. (2025), and Delgado-Lobete et al. (2021).

Only 30.0% of respondents were functionally independent in instrumental activities of daily living (IADL), with 39.0% and 31.0% classified as moderately and severely impaired, respectively. The highest rates of dependence were observed in food shopping (50.5%), cash handling (43.2%), laundry (42.3%), and housekeeping (39.6%). Significant associations were found between IADL tasks, including food preparation, housekeeping, telephone usage, talking, and understanding and disability type ($p < 0.05$). These findings align with Delgado-Lobete et al. (2021) and Bruderer et al. (2022), who emphasised that IADLs place complex physical and cognitive demands on individuals.

Communication-intensive IADL tasks were particularly challenging for respondents with speech and hearing impairment and cognitive impairment. Nearly all respondents with speech and hearing impairment were dependent in telephone usage, and the majority were dependent in talking. Visually and physically demanding tasks such as food shopping and cash handling posed the greatest challenges for visually impaired and mobility-impaired respondents. These patterns echo observations by Muradyan (2023), Vincent et al. (2024), and Soman and Sudhier (2021), who highlighted the centrality of sensory capacity and assistive technologies in determining IADL independence.

The dietary profiles of respondents revealed a complex nutritional landscape characterised by caloric insufficiency, selective macronutrient excess, and widespread micronutrient deficiency. All groups fell short of their caloric RDAs, consistent with documented energy inadequacy among Nigerian adolescents, both broadly and in southwest Nigeria specifically, where mean intakes as low as 1,070 ± 196.7 kcal/day have been recorded among school-going adolescents in Osun State (Ogunkunle & Oludele, 2013; Abubakar et al., 2024). Caloric insufficiency in this physically challenged population is likely compounded by reduced food access, caregiver dependency, and institutional dietary constraints (Olarewaju, 2024). Protein was the only macronutrient that met or exceeded the RDA across all groups, indicating adequate legume or mixed protein consumption. Carbohydrate intake was markedly excessive (>200% RDA), mirroring the starchy-staple-dominant diet of southwest Nigeria, where cassava, yam, and rice comprise the dietary base (Gabriel et al., 2024). Fat was consistently below the Acceptable Macronutrient Distribution Range (AMDR-derived reference) (64.4–86.7% of RDA), indicating that energy is drawn disproportionately from carbohydrates, a pattern reported in other adolescent dietary surveys in Ogun (Ogunkunle & Oludele, 2013). Dietary fibre fell below the adequate intake in all groups (57.1–64.9%), despite high carbohydrate intake reflecting reliance on refined rather than whole-food sources. Low fruit and vegetable consumption among Nigerian adolescents, documented in Sagamu and Lagos (Sholeye et al., 2018; Abubakar et al., 2024), explains this paradox and predicts long-term cardiometabolic risk (Dahl & Stewart, 2015).

Vitamin A was remarkably elevated across all age-sex groups in this study, ranging from 1,045.7% to 2,003.8% of RDA. This is likely attributable to high consumption of cooked, deeply coloured vegetables rich in provitamin A carotenoids, such as spinach, dark leafy greens, palm oil, and orange-fleshed vegetables, which are commonly consumed in southwest Nigerian households. This finding contrasts with the national picture: a systematic review reported vitamin A deficiency prevalence ranging from 44 to 96% among Nigerian adolescents across studies, with inadequate intake widely documented (Abubakar et al., 2024). The elevated values observed in the present study may reflect dietary patterns specific to the Ilaro community or to the school feeding environment, and should be interpreted with caution. Since the source is plant-derived beta-carotene, toxicity is unlikely; however, the divergence from national deficiency patterns warrants further investigation.

Vitamin C intake was nearly absent across all groups, with median levels as low as 0.0% of RDA recorded among males. This represents a critical and consistent deficiency with significant implications for immune function, collagen synthesis, and non-haem iron absorption. Insufficient vitamin C intake has been reported extensively among Nigerian adolescents (Abubakar et al., 2024; Gabriel et al., 2024). In the Southwest, poor fruit and vegetable consumption, the primary dietary sources of vitamin C, has been documented in Lagos (Silva et al., 2017, as cited in Gabriel et al., 2024) and Sagamu (Sholeye et al., 2018). For a physically challenged population whose immune competence and tissue repair capacity may already be compromised, this degree of vitamin C deficiency is of particular concern.

B-vitamin adequacy showed a striking sex-based disparity. Early adolescent males met or exceeded the RDA for vitamins B1, B2, B3, and B12, while females in the same age group were severely deficient in all four. Late adolescents of both sexes were broadly deficient. This pattern suggests that sex-differentiated food access, appetite, or dietary choices influence micronutrient intake even within the same institutional setting and mirrors broader gender-based nutritional disparities reported across Nigeria (Gabriel et al., 2024). Notably, vitamin B12 was severely deficient among females and late adolescents of both sexes, a finding previously reported among Nigerian children in Ibadan, where 55–80% had B12 intakes below the Estimated Average Requirement (Tassy et al., 2021). Folate (B9) was critically low across all groups, ranging from 7.5% to 23.3% of RDA. This represents the most uniformly severe single-nutrient deficiency in the study. Folate is indispensable for DNA synthesis, cell division, and neurological development, and its deficiency is strongly associated with megaloblastic anaemia and neurological impairment. The systematic review by Gabriel et al. (2024) documented folate intakes of 0–136.6 mg among Nigerian adolescents, with virtually all studies reporting insufficient consumption. Nationally, folate deficiency has been identified as a significant public health concern, and targeted supplementation of iron and folic acid has been specifically recommended by health authorities for adolescent populations in Nigeria (Federal Ministry of Health, 2021). In this physically challenged population, folate inadequacy compounds risks already associated with physical disability, including increased vulnerability to anaemia and impaired cognitive function. Similarly, vitamin B6 deficiency was severe in all groups except early adolescent males, further constraining neurological health and amino acid metabolism. Vitamin B12 availability is tied to animal-source food consumption, which can vary with age-related food preferences and caregiver feeding decisions rather than with household food availability alone. These deficiency patterns are broadly consistent with the dual burden of malnutrition documented in low- and middle-income populations (Sodiya et al., 2026)

and are more severe and broader than that reported by Shabayek (2004) in a similar special-needs population in Egypt.

Calcium was the most critically deficient mineral, with all groups achieving only 10–11% of RDA. Adolescence is the decisive window for peak bone mass, and persistent calcium inadequacy at this stage predicts osteoporosis and fracture risk in later life (Oyibo et al., 2021). Calcium deficiency among southwest Nigerian adolescents has been documented in Oyo and Ogun States, where intervention studies and a cross-sectional study have confirmed poor dietary calcium intake and low awareness of calcium-rich food sources (Senbanjo et al., 2014; Sodiya et al., 2026). For physically challenged adolescents, potential immobility and reduced sun exposure further compromise vitamin D-dependent calcium utilisation. Magnesium was inadequate across all groups. Iron appeared dramatically elevated (281–1,037% of RDA), most likely reflecting consumption of iron-fortified staples under Nigeria's mandatory fortification policy; however, the near-absent vitamin C intake severely limits non-haem iron bioavailability (Harika et al., 2017). Zinc similarly exceeded the RDA across all groups, though phytate-rich cereal-based diets reduce its bioavailability.

Sample adolescents classified as functionally independent in BADL tended to have normal height-for-age, while those with mild BADL impairment were more frequently mildly stunted. For IADL, those with mild functional impairment showed higher proportions of mild-to-moderate stunting. The divergence from studies such as Nagai et al. (2023), who identified IADL decline as a risk factor for nutritional deterioration in older adults, may be explained by differences in sample characteristics and age-group composition, as noted by Pragadesh et al. (2024) in adolescent populations.

Study Limitations

This study has several limitations. Study participants were recruited from a single special needs school in Ilaro, which may limit the generalisability of findings to other settings. Although the entire accessible school population was included, the sample size (n = 111) was relatively small and may have reduced statistical power for subgroup analyses. Dietary intake was assessed using a single 24-hour recall conducted on a school day, which may not reflect habitual intake, and weekend or holiday dietary patterns were not captured. Dietary assessment was conducted during a season when the availability of fruits and certain vegetables was low. There were no overt clinical signs of scurvy or beriberi documented during data collection, but clinical examination was not a component of the study protocol. The BADL and IADL tools were originally validated in adult populations but were adapted for this study context. Finally, the cross-sectional design limits causal inference regarding the relationships among disability, anthropometric indices, and functional capacity.

Conclusions

This study demonstrates that physically challenged adolescents attending the School of Students with Special Needs in Ilaro carry a dual burden of nutritional inadequacy and functional dependency, both closely shaped by disability type. The dietary landscape was paradoxical: while protein, carbohydrate, vitamin A, iron, and zinc met or exceeded recommended levels in most age-sex groups, energy and fat intakes were universally deficient, and critical shortfalls in vitamin C, calcium, folate, B-complex vitamins, potassium, and magnesium were pervasive. These deficiencies were particularly pronounced among females and older male adolescents, reflecting both sex-differentiated dietary patterns and heightened physiological requirements during late adolescence. The high prevalence of stunting (68.0%), despite near-normal BMI-for-age in many participants, signals chronic undernutrition with long-term implications for growth trajectory, cognitive development, and future productivity. Functionally, while most respondents retained independence in basic self-care, only 30.0% maintained IADL independence, with substantial dependence in tasks requiring planning, mobility, and communication. The type of disability emerged consistently as the primary determinant of functional capacity across both BADL and IADL domains. Collectively, these findings underscore the urgent need for disability-sensitive nutritional and rehabilitation interventions within Nigeria's special needs school system.

Recommendations

Based on these findings, it is essential to develop interventions that address both the nutritional and functional needs of physically challenged adolescents. Given the widespread deficiencies in vitamin C, calcium, folate, and B-complex vitamins, school feeding programmes in special needs institutions should be redesigned to incorporate micronutrient-rich foods, including fruits, vegetables, dairy products, and legumes. Where dietary diversification alone is insufficient, targeted supplementation regimens should be implemented, with particular attention to the distinct nutritional needs of adolescent females and older male students. Particularly when seasonal availability is low, there is a need for micronutrient supplementation (including Sprinkles for students unable to swallow tablets) and targeted caregiver nutrition education. Home- and institution-based caregivers, teachers, and school administrators should receive structured training on the specific nutritional requirements of adolescents with physical disabilities, including disability-adapted feeding techniques and strategies to promote dietary diversity (UNICEF, 2024). Practical skill-building sessions focused on instrumental activities of daily living, including supervised food preparation, shopping, cash handling, and laundry, should be embedded in the school curriculum. These sessions should be disability-type-specific and should draw on principles of occupational therapy and real-life task simulation.

Author Contributions

AAB: Conception/design, development of data collection instrument, interpretation of data, data collection, manuscript preparation and revision. ADD: Data visualisation and presentation, manuscript formatting, interpretation of data, manuscript preparation and revision. AMO: Manuscript formatting, interpretation of data, manuscript preparation and revision. OBT: Data collection, interpretation of data, manuscript preparation and revision. SOA: Interpretation of data and manuscript preparation and revision. ARO: Data collection, interpretation of data, manuscript preparation and revision. All authors have read and approved the final version of the paper and its submission and have given consent for publication.

Declaration of Generative AI and AI-Assisted Technologies in Scientific Writing

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Data Availability Statement

All relevant data are available within the manuscript

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Conflict of Interest

The authors declare that they have no conflicts of interest.

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