FUDMA Journal of Sciences (FJS)
ISSN online: 2616-1370
ISSN print: 2645 - 2944
Vol. 7 No. 2, April, 2023, pp 256 - 264
DOI: https://doi.org/10.33003/fjs-2023-0702-1689

EFFECT OF SCHOOL FEEDING PROGRAMME ON NUTRITIONAL BALANCE IN PRIMARY SCHOOL PUPILS IN KANO METROPOLIS

***[1]Karimah Muhammad Rabiu, [2]Siddiq Ali Idoko, [2]Aderounmu Ibrahim Ganiyu**

[1]Department of Biological Sciences, Yobe State University, Damaturu - Nigeria
[2]Department of Biochemistry and Molecular Biology, Federal University, Dutsin-Ma, Katsina - Nigeria

*Corresponding authors' email: karima.mohammed300@gmail.com

ABSTRACT

The growth and development of young children in elementary school depend heavily on proper nutrition. The overall nutritional outcomes of the children must be improved by school-based dietary interventions, particularly in low socioeconomic regions. Aim of the study was to determine the effect of School Feeding Program (SFP) on nutritional balance in government sponsored Primary school pupils in Kano Metropolis. The study was conducted in Dala, Kano Municipal, Gwale, Nassarawa and Tarauni. A cross-sectional survey was carried out among 2052 pupils selected using a two-staged sampling technique from seventy-eight primary schools benefitting from the feeding program and eight schools that were not part of the feeding program. Data was analyzed using SPSS (version 25). A 95% confidence interval was used and a probability value of $p \leq 0.05$ was considered statistically significant. Weight and height measurements were converted to weight-for-age Z-scores (WAZ), height-for-age Z-scores (HAZ), body mass index (BMI) and BMI-for-age Z-scores (BAZ) using WHO AnthroPlus software (version 1.0.4). There was statistically significant difference in anthropometric indicators of the pupils in both groups ($p<0.05$). The prevalence of underweight, stunting and thinness among school-fed pupils was 15.2%, 7.3% and 20.5% respectively compared with 27.7%, 17.8% and 24.1% respectively among the non-school fed pupils. Comparisons between beneficiaries of the SFP versus non-SFP beneficiaries (control) yielded significant differences ($p<0.05$) for school performance, showing the impact of the SFP program on cognitive skills and abilities of pupils. Findings suggest that the school feeding program could significantly improve nutritional status of beneficiaries.

Keywords: School feeding program, nutrition balance, pupils, underweight, stunting, thinness

INTRODUCTION

One of the most important public health issues in Nigeria and around the world is childhood malnutrition (Ogunnaike *et al.*, 2021). Malnutrition is implicated in morbidity, disability, and mortality notably among infants and children within ages 5-10 (Pelletier, 1994). Children's long-term physical, emotional, and cognitive development is impacted by their food. (Dahab *et al.*, 2020). Unfortunately, most students, especially those in public primary schools, do not have access to a nutritious diet, primarily because of poverty (Nowsin *et al.*, 2014). As a result, they are currently more susceptible to health problems caused by malnutrition (Shree and Murthy, 2021), which have the potential to lead to decreased productivity and, ultimately, a slowdown in the economy and the development of the state. In Nigeria, 2.7 million children are wasted and over 14 million are chronically underweight (UNICEF, 2007). A continuous diet lacking in nutrients causes an estimated 50% of school-age children in Kano state to be stunted (Akanbi and Alayande, 2013). According to the research, 80% of families in Kano state are food insecure (FAO, 2017). With assistance from UNICEF and the New Partnership for Africa's Development (NEPAD), the Nigerian government launched the school feeding program. All Nigerian primary school kids would get one meal each school day in order to increase enrolment, retention, and graduation rates while also improving student health. The school feeding program, which is regarded as an important component of the national development goals, gives kids a social safety net.

Research has shown that over 40% of the affected children come from Africa, and that there are 66 million students who report going to school every day without enough food (Bundy, 2009). The midday meal is a welfare system for students and a part of the public policy objectives. It offers for poor families to be assisted with the feeding of their children and provides a motivation for families to enroll their children in school.

Schoolchildren's issues with micronutrient deficiencies, anemia, overweight, and obesity, as well as the repercussions that follow, have been much improved by providing meals to students, particularly those in lower classes who are the most vulnerable (Adelman *et al.*, 2008). The project encourages parents to bring their kids to school and helps the community's economically needy members feed their kids. It had been applied to deal with malnutrition-related issues (Adelman *et al.*, 2008). The goal for why learning was regarded vital for humans is significantly undermined when it occurs while a person is hungry (Akanbi, 2013).

It appears that no studies have been conducted to determine how the Kano school feeding program affects the nutritional status of its students. Therefore, there are little or no real statistics available on the efficacy of meals provided to primary school students in Kano. Therefore, in order to produce relevant data that could be used as the currency for securing funding from funding organizations to support this life-saving project and its big objectives, the effectiveness of the school feeding program must be evaluated in terms of the nutritional health of the target population. In order to ensure the sustainability of health promotion programs, they should be assessed for relevant data (McMichael *et al.*, 2005). It had never been "performance evaluated" how well the aforementioned intervention worked with the target population, which is a crucial factor in determining the effectiveness of all programs (PERL, 2016).

METHODS

Study location

The study was carried out in the Kano State metropolis. Eight local governments make up the region: Dala, Kano Municipal,

Gwale, Nassarawa, Tarauni, Fagge, Kumbotso, and Ungoggo. The city of Kano is situated 472 meters above sea level, between parallels 110 05' N and 12007' N, and between longitude 8023' E and 8047' E. There are around 505,700 students enrolled in 1,947 primary schools in the metropolitan region (KSMOE, 2022). The Kano metropolis was chosen because it has a diverse population, with a substantial proportion of the most vulnerable age group, children aged 5 to 10 living there.

Ethical clearance

The state ministry of education was asked for permission, and the health ministry gave ethical clearance. The approval was then communicated to the education secretaries of the several local government education authorities and school principals. Informed consent was also given by the students' parents.

Research design

In order to determine the incidence of malnutrition and related issues among students getting meals in elementary schools in Kano, a cross-sectional study was undertaken. The approach was chosen because it enabled the study to gather data all at once. Additionally, evaluation of the effects of the school feeding program on students' nutritional status was made seamless and possible by the design. The survey was suitable since it allowed the researcher to gather data using a variety of techniques to gather information. Survey was carried out using a semi-structured questionnaire to determine socioeconomic factors. This type of questionnaire was used because it is open ended, thus allowing the subjects to express their own views in response to certain compelling questions.

Target population

The study's main population was made up of elementary school children attending public schools in the metropolis.

Study population

Pupils aged 5-10 from selected primary schools within the metropolitan area served as research participants.

Study period/duration

The research was carried out over the first four weeks of both the first and second terms of the 2021/2022 academic year. It lasted for eight weeks.

Sample size

A total of 296,300 kids were enrolled in the 1225 state primary schools. Using a critical value of 1.96 at a 95% confidence range and a 5% margin of error, the necessary sample size for each local government was calculated. For students who get benefits from the school feeding program (SFP), this resulted in a sample size of 1861, while for students who do not, it produced a sample size of 191.

Formula used to determine sample size:

$$n_h = N_h \times \frac{\frac{Z^2 \times p_h \times (1-p_h)}{e^2}}{\left[N_h - 1 + \frac{Z^2 \times p_h \times (1-p_h)}{e^2}\right]}$$

Where,

n_h = Sample from local government *h*,

N_h = Total number of pupils from local government *h*,

Z = Critical value of the normal distribution at the required confidence level,

p_h = Sample proportion of local government *h*,

e = Margin of error

The overall minimum sample required was obtained as $n = \sum_{i=1}^{h} n_h$ Where $h = 5$.

Sampling technique

A multi-stage sampling procedure was used. The study's sample was drawn at random from five of the eight local government regions. In order to get a representative sample, the five local government regions were regarded as clusters. Randomly selected from the list of schools provided from the relevant Local Government Education Authorities was one-half of the schools from each local government. Based on the student population of Primary 1, 2, and 3 schools that are beneficiaries of the school feeding program (SFP) and those that are not, proportionate sampling was used to determine the number of participating kids per school. By answering "YES" or "NO" in response to a question, students from each class were chosen at random. The research included students who selected YES.

Anthropometric measurements

Height

A measuring tape was used to determine height (in cm). Using a BMI calculator, the body mass index (BMI) was calculated as the ratio of weight (kg) to height (m^2) (kg/m^2).

Weight

Weight was measured using the WHO (2008) technique. In order to assure accuracy, a manual Camry scale was calibrated to zero before use.

Mid-Upper Arm Circumference (MUAC)

Using a regular measuring tape, the mid-upper arm circumference (MUAC) was calculated in cm.

Prevalence of chronic malnutrition

Data on height, weight, and age were converted into Z-scores using the World Health Organization (WHO) AnthroPlus software (version 1.0.4). Using the collected indices, it was possible to estimate the prevalence of stunting, underweight, thinness, and overweight. Results were evaluated against the WHO Growth Standards from 2007.

RESULTS

Students' sociodemographic profile

Table 1 lists the sociodemographic information for the research sample. 90.6% of the students came from the 78 SFP recipient schools. The smallest sample size (n=191) was found among students from schools that were not beneficiaries. The age disparity was statistically significant ($P<0.05$) and in favor of the SFP receiving schools. There was no statistically significant difference based on class ($P=0.331$). However, at $P<0.05$, there was a substantial change in students' academic performance.

Students with high academic success made up more of the SFP group (23.8%) than the non-SFP group (17.3%). Additionally, the SFP group had more students who performed well than the non-SFP group (32.3% vs. 28.3%). The SFP group contains considerably more pupils that performed poorly (27.5%) in comparison to non-beneficiaries (24.1%). But this was not statistically significant. Comparing students at the SFP beneficiary school to those in the non-beneficiary schools, there was no statistically significant difference in the number of missing school days.

At $P<0.05$, there was a significant difference in the methods of transportation to school. The majority of non-beneficiaries (88%) walk to school. and more than half of recipients (65,2%) also walk to school. However, there was no statistically significant difference in house size or the number of times pupils ate lunch between the two research groups.

81.3% of recipients don't bring any supplies to school, either money or food.

What students buy when they bring money to school has statistically significant results. In favor of SFP recipients, the majority of students (91.3%) purchase snacks.

Table 1: Socio-demographic characteristics of study participants

Variables	SFP Beneficiaries		Non-beneficiaries		P-value
	n	%	n	%	
Age group (years)					<0.0001*
5 to 6	317	94.9	17	5.1	
7 to 8	1052	91.6	96	8.4	
9 to 10	492	86.3	78	13.7	
Class					0.331
Class 1	512	91.1	50	8.9	
Class 2	718	92.1	62	7.9	
Class 3	631	88.9	79	11.1	
School performance					<0.0001*
Excellent	443	93.1	33	6.9	
Good	602	91.8	54	8.2	
Fair	304	84.0	58	16.0	
Poor	512	91.8	46	8.2	
Missed days of school					0.132
None	715	91.9	63	8.1	
1 to 2 days	581	93.3	42	6.7	
3 to 4 days	406	89.4	48	10.6	
5 days and more	159	80.7	38	19.3	
Means of getting to school					<0.0001*
Walk	1213	87.8	168	12.2	
Private car	101	97.1	3	2.9	
Public transport	502	96.2	20	3.8	
Number of people in household					0.387
2 to 4	430	89.4	51	10.6	
5 to 7	611	91.3	58	8.7	
8 to 10	516	92.8	40	7.2	
≥11 Not sig	304	88.1	41	11.9	
Times you eat in school					0.004
Once	1621	89.8	185	10.2	
Twice	235	97.5	6	2.5	
Thrice	5	100.0	-	0.0	
Does this include meals given at school?					
Yes	1583		Not applicable		
No	278				
Do you usually take food or money to school?					<0.0001*
Food	241	78.8	65	21.2	
Money	53	52.0	49	48.0	
Both	16	43.2	21	56.8	
None	1351	96.0	56	4.0	
If you take money to school, what do you usually buy?					<0.0001*
Cooked food	24	61.5	15	38.5	
Snack	1837	91.3	176	8.7	
Do you usually eat before going to school?					0.079
Yes	551	88.2	74	11.8	
No	389	93.3	28	6.7	
Sometimes	921	91.2	89	8.8	
How many times do you eat per day during school holidays?					0.069
Once	315	94.9	17	5.1	
Twice	911	90.3	98	9.7	
Thrice	635	89.3	76	10.7	
How often do you eat food given at school?					
Always	1658		Not applicable		
Sometimes	203				
Never					

Is there a time/day food is not given at school?		
Yes	1861	Not applicable
No	-	

*Statistically significant at P<0.05

Anthropometric status of pupils

Data from Table 2 show that, at P<0.05, the difference in mean age between receivers and non-recipients was statistically significant. Similar to mean weight, BMI, and MUAC, there was statistical significance between the two groups at P<0.05 for each of these variables. However, the average height did not show any statistical significance (P=0.229).

Table 2: Anthropometry of SFP recipients and non-recipients

	SFP Beneficiaries	Non-beneficiaries	
Variables	**Mean**	**Mean**	**P-value**
Age (years)	7.71 ± 1.3	8.12 ± 1.2	<0.0001*
Weight (kg)	21.2 ± 3.8	20.1 ± 3.5	<0.0001*
Height (cm)	122.7 ± 8.0	122.0 ± 6.7	0.229
MUAC (cm)	17.1 ± 1.5	16.23 ± 1.5	<0.0001*
BMI (kg/m^2)	14.0 ± 1.4	13.5 ± 1.7	<0.0001*

*Statistically significant

Results are statistically significant at P<0.05; Mean ± standard deviation

Prevalence of chronic malnutrition and underweight

Weight-for-age z-scores (WAZ)

As indicated in Figure 1, the difference in weight-for-age z-scores (WAZ) between school feeding receivers and non-recipients was statistically significant at P<0.05. Of the pupils who received meals, 19.7% were underweight. 15.2% were considered to be moderately underweight, while 4.5% were extremely underweight. In the non-beneficiary category, 45% of people were underweight. While 27.7% were overweight, 17.3% were severely underweight. Only a tiny percentage of students in both groups—1.1% for SFP users and 0.5% for non-beneficiaries—were overweight.

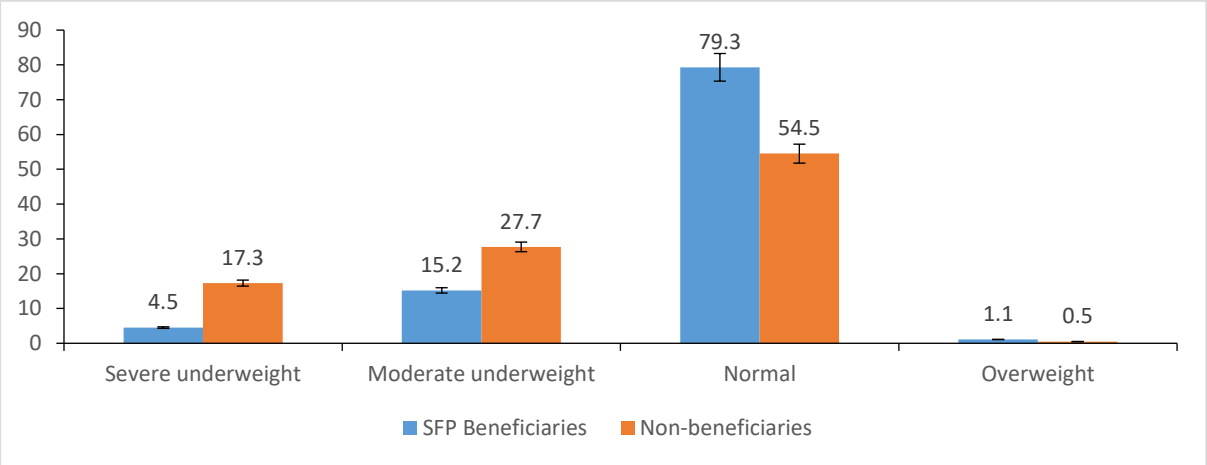

Figure 1: WAZ for SFP recipients versus non-recipients

Height-for-age z-scores (HAZ)

The beneficiaries of the school feeding program (SFP) had statistically significant HAZ scores (P<0.05) as compared to non-beneficiaries, as seen in Figure 2. There were more pupils with normal weight in the SFP group (91.8%) than in the non-SFP group (81.2%). Only 7.3% of students in SFP beneficiary schools had moderate stunting, compared to 17.8% of students in non-beneficiary schools. This difference was statistically significant (P<0.05). Only a tiny percentage of students (from both groups) were found to be severely stunted, while a minor percentage of recipients (0.2%) were found to be extraordinarily tall.

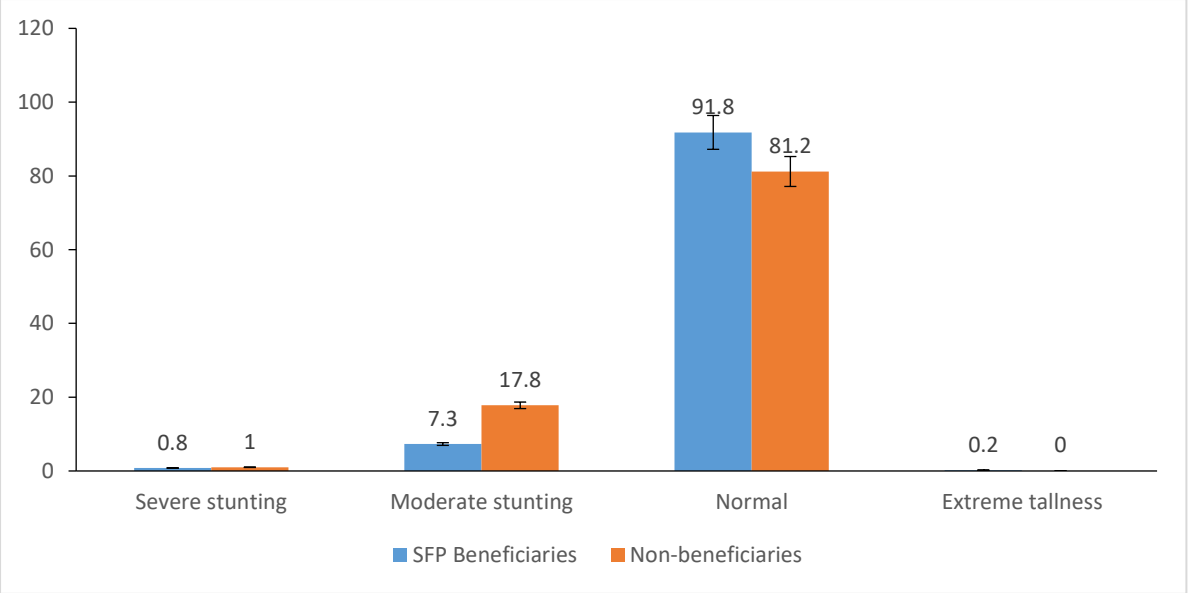

Figure 2: HAZ for SFP recipients versus non-recipients

BMI-for-age z-scores (BAZ)

The BAZ for SFP beneficiaries versus non-recipients is shown in Figure 3. Significantly underweight students made up 7.9% of beneficiaries and 19.4% of non-beneficiaries. In contrast, 24.1% of non-recipients and 20.5% of beneficiaries were overweight. In comparison to 56% of normal non-beneficiaries, almost 70% of beneficiaries were normal in terms of HAZ.

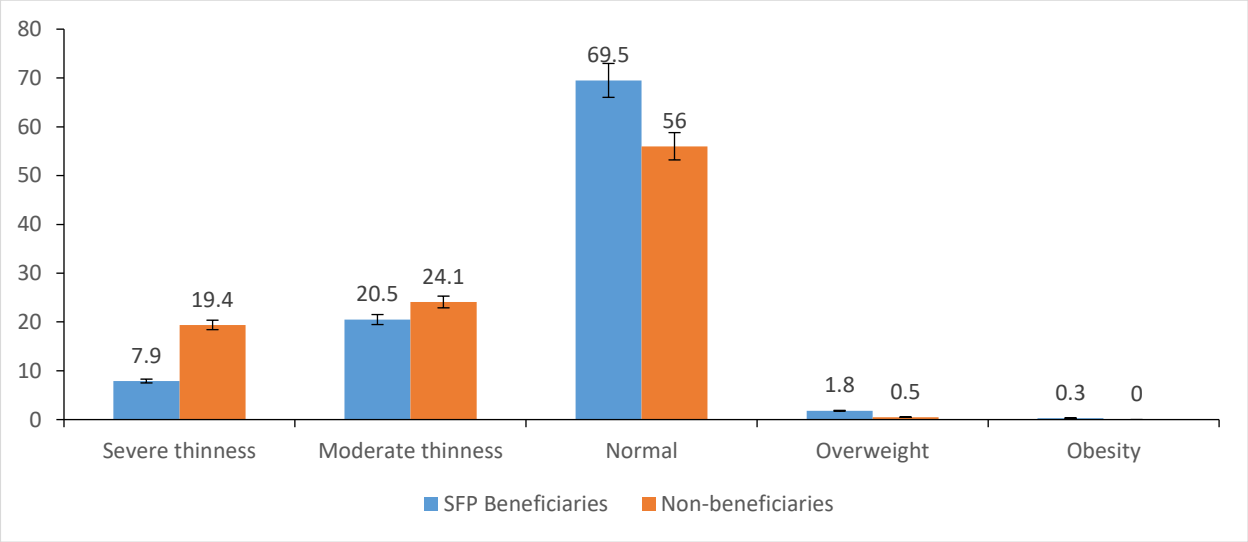

Figure 3: BAZ for SFP recipients versus non-recipients

DISCUSSION

Socio-demographic characteristics of the study participants

The research included 2052 pupils from 78 primary schools. The range of their ages was five to 10. 90.6% of the entire sample consisted of students from the recipient schools. The program could only serve students in lower classes; therefore, the students were in classes 1-3. This can be a result of the significant financial load this endeavor entails. This contradicts research conducted in Jamaica by Grantham-McGregor *et al.* (1998), which chose students from classes three and four.

The academic achievement of the students who get food assistance was statistically significant at P>0.05. Comparing students from SFP beneficiary schools to students from non-beneficiary schools, it is clear that the former exhibit better intellectual capacity and a greater percentage of students who do well. This demonstrates that the school meals are supplying the nutrients required for healthy brain function. This result is consistent with prior research by Simeon *et al.* (1990). They arrived to the conclusion that pupils who eat well had greater cognitive performance than those who eat worse. According to Jomaa *et al.* (2011), students who eat lunch at school do better on tests, examinations, and other tasks requiring logical mental processing of information than those who do not. Similar to this, research by Ayoola (2014) confirmed that there was statistical significance between the reading and math test results of students in schools that offer school lunches and those in schools that do not. According to research by Maijo (2018), school lunches have a significant influence on students' academic progress. The study's findings also showed a 31% rise in the proportion of students who completed their exams. In a related research, Taylor and Ogbogu (2016) found that the Osun State School Feeding Program had a 55.2% positive impact on the performance of students in the state's primary schools.

While there was a high attendance percentage among students in the beneficiary schools, the absence rates of students who get meals compared with non-recipients was not statistically significant. Both groups—those who missed no school days (91.9%) and those who missed only a couple of days (93.3%)—might have been ill. According to Oyefade (2014), school food is an excellent incentive method for boosting student morale and attendance rates. Students' attendance rates have increased as a result of the school feeding program (Maijo, 2018).

Comparatively speaking, more non-SFP beneficiaries than SFP recipients walked to school. Statistical analysis also revealed that this was significant. These results most likely reflect a little variation in the socioeconomic status of the pupils. Another factor is being near a school. Therefore, it is not surprising that a higher percentage of pupils in both categories walk to school. For general health and wellbeing, physical activity is crucial. Students who walk or bike to school had a reduced incidence of being overweight than those who drive to school, according to Denstel *et al.* (2015) and Sarmiento *et al.* (2015).

No food or money is brought to school by 81.3% of recipients. This implies that program participants who get school meals rely on them. An appropriate nutritional status may be maintained using this approach, per the anthropometric data. Students' low academic and health outcomes have been related to household food poverty. (Naicker *et al.,* 2015; Tamiru and Belachew, 2017). The erratic eating patterns and low food intake caused by a lack of funds may be to blame for the non-SFP beneficiaries' worse nutritional status..

Anthropometric status of pupils

The SFP grantees benefited from the age disparity. Less students attended beneficiary schools than non-beneficiary schools. This suggests that SFP beneficiaries started school substantially earlier than non-beneficiaries did. School feeding programs (SFPs), among other programs, allegedly urge parents and guardians to enroll their offspring in school as soon as possible, according to a report by Finan *et al.* 2010. This is consistent with Ayoola's (2014) results that admittance has been rising consistently since the lunch plan was put into place. Similar to this, Wang and Fawzi (2020) discovered a positive relationship between meals served in schools and admission rate as well as nutritional improvement in their investigation of how school meals influence school-age children and adolescents' educational and health outcomes in low- and nations with a moderate income. According to Jumare (2020), there is strong evidence that the school feeding program has significantly improved student enrollment. Previous comparative research by Dreze and Goyal (2003) and UNICEF (2007) also found that school meals had a positive effect on enrollment. It was discovered that beneficiary schools had double the enrollment of non-beneficiary schools. Parents are encouraged to enroll their children in school at a young age by the school food project and other nutrition-related incentives (Finan *et al.,* 2010). The mid-upper arm circumference (MUAC), mean weight, and BMI of SFP beneficiaries differed significantly from those of non-beneficiaries, although the difference in mean height between meal receivers and non-recipients was not statistically significant. The program's beneficiaries carried more weight. According to Rocha *et al.* (2018), students who attend schools that participate in the feeding program had higher BMIs than students who do not. SFP recipients had higher nutritional health as a consequence. Admission to the program, according to Davis *et al.* (2020), increased students' BMI by almost 0.07 standard deviations, which is equal to an increase of 2 percentage points in the reference distribution or nearly 3 pounds. Similar to this, Mohammed *et al.* (2022) discovered that improvements in BMI were related to the meals served in schools. Students that received school meals increased in weight and height in a scarcely significant way, according to Hall *et al.* (2007).

Lawson (2012) countered that short term research that examine the effect of SFP on dietary indicated no meaningful changes on the anthropometric outcomes.

Prevalence of chronic malnutrition and underweight

WAZ is one of the most common markers of children's nutritional status (Lannotti *et al.,* 2016). It is a reliable indication of both chronic and acute malnutrition and measures if a child's nutrition is sufficient to promote growth. In this study, WAZ found that the majority of SFP recipients (79.3%) and non-SFP beneficiaries (54.5%) were within the recommended weight limit. However, there were considerably more underweight schoolchildren in the SFP non-beneficiary group (45%; 17.3% were extremely underweight and 27.7% were moderately underweight). among the beneficiaries, there were also considerably more students of normal weight. Students who had lunch had better nutritional health than their counterparts who don't receive meals at school, according to studies by Banwat *et al.* (2018) and Prince and Laar (2014). The SFP recipients' greater calorie consumption may be the reason for this. Only a tiny percentage of students in both groups were overweight, and it was determined that this was not significant. For individuals who were in danger of becoming very underweight, the difference between SFP receivers and non-recipients grew more pronounced. The WAZ of SFP receivers was significantly different from that of non-recipients, making the latter group more likely to be severely underweight. This is consistent with past research that evaluated the nutritional status of school lunch users and non-recipients, which similarly discovered a greater frequency of underweight among those who don't benefit from the program (Eluya, 2019; Olumuyiwa *et al.,* 2012). Iyalomhe *et al.* (2018) comparable research supports the present findings. The healthy nutritional status of recipient students shows that they were getting enough nutrients in their diets.

HAZ factor was utilized to determine height in relation to healthy growth. When comparing pupils who eat lunch with those who do not, there was a significant difference in HAZ ($P<0.05$). The SFP grantees had more pupils with normal weight (91.8%) than the non-SFP group (81.2%) did. More students who weren't receiving benefits were found to be stunting. Furthermore, statistical significance was discovered for this. The increased calorie intake and micronutrient requirements for proper physical growth may explain why program participants had greater height. According to Kwabla *et al.* (2018), students from schools not participating in the program had higher rates of undernutrition, particularly stunting, compared to SFP recipients. Buttenheim *et al.* (2011) found positive impact on height in a nutritional study that took place over a two-year period. Students in the treatment group had noticeably improved development outcomes, it was found. These results support the findings of a related study by Jos, Banwat *et al.* (2018), which found that students who benefited from the school meal program had decreased stunting. Additionally, compared to their peers in schools that are not a part of the program, those who benefited from school meals showed superior knowledge of foods and dietary practices (Banwat *et al.,* 2018). The results of this study are in line with those of a previous study done in Osun State, which found that stunting was more prevalent among

non-beneficiary students than beneficiary students (Olumuyiwa *et al.,* 2012). The lunch intervention had a positive effect on HAZ and BAZ of youngsters aged five to eight living below the poverty line, according to Gelli *et al.* (2019) in research regarding a school meal programme carried out at Scale in Ghana. With large benefits for poor students, school meals can serve as a launchpad for increasing nutrition interventions in the early primary school years (Gelli *et al.,* 2019). Stunting prevalence rates were lower among school feeding receivers (16.2%) than among non-beneficiaries (17.2%), according to research conducted in Ghana by Black *et al.* (2018). Similar to this, Ethiopian research found that HAZ was considerably higher ($P<0.001$) among students who took part in the school feeding program.

Using BAZ, children's thinness is evaluated (Yussif *et al.,* 2022). In this study, 69.5% of the beneficiaries and 56% of the non-beneficiaries had BAZ values that were normal. For beneficiaries against non-beneficiaries, severe thinness was 7.9% versus 19.4%. $P<0.05$ indicated that the difference was statistically significant. The SFP recipients appear to have had better nutrition than non-beneficiary students based on the difference in BMI-for-age (BAZ) between the two groups of students. This is in line with research (Malongane and Mbhenyane, 2017) that evaluated the nutritional status of kids participating in the national school nutrition program in the Limpopo Province, South Africa. According to research by Ayoola (2014), there were noticeably more underweight pupils at schools that were not beneficiaries of the program than there were in schools that were. Beneficiary students also had a larger percentage of students who are inside the normal range. The SFP likely helps students who would otherwise come from underprivileged households and be at danger of malnutrition by providing them with food. Children who consumed school lunches had noticeably increased BMIs (Hofferth and Curtain, 2005). In research by Ayehu and Sahile (2021), it was shown that school lunch attendees had considerably higher average BMIs related to their ages than non-recipients. This finding led to a similar conclusion. In northern Ethiopia, students who received school meals performed better on the BAZ and HAZ tests than students who did not (Zenebe *et al.*, 2018). In contrast to the findings of the current investigation, a prior study by Wang *et al.* (2021) found that school meals had no discernible impact on the undernutrition indices WAZ, HAZ, and BAZ. The lack of an impact on the anthropometry Z-scores might be attributed to the effects' minor amplitude, which may not have been adequate to express a nutritional improvement (Wang *et al.,* 2021). Desalegn *et al.* (2022), in contrast to the findings of this study, also found that pupils who got school lunches did not significantly grow taller or heavier than those who did not. A comprehensive review research, however, found that school feeding programs in developing countries had a small but significant influence on students' body mass and size (Watkins *et al.,* 2015). According to comparable research, students who did not participate in the program had a twofold greater chance of being underweight, but there was no appreciable risk of stunting (Demilew and Nigussie, 2020; Gutama, 2017). However, Yussif *et al.* (2022) claim in a meta-analysis study to determine the impact of the program on nutrition-related physical effects on students that the school meal had no positive or significant effects on the students' physical nutrition scores. This could be because of the study's time constraints, partial compliance, and the fact that students didn't entirely eat school meals. Further research by Jomaa *et al.* (2011) supports this opposing conclusion, which is that the school feeding program had no beneficial impact on the thinness status of students receiving school meals. However, studies conducted in Bangladesh (Ahmed, 2004), Jamaica (Grantham-McGregor *et al.,* 1998; Powell *et al.,* 1998), Kenya (Mwaniki and Makokha, 2013), and Lao (Buttenheim *et al.,* 2011) as well as the present study, as reported by Desalegn *et al.* (2022), also came to the same conclusion that school feeding significantly improves pupils' physical nutritional outcomes.

CONCLUSION

The school feeding initiative has undoubtedly made an attempt to improve pupils' nutrition in light of the results, which will boost their health condition, learning outcomes, and even enrollment. Results indicate that pupils who get meals at school have positive effects on their general physical health. The beneficiaries' nutritional condition was markedly enhanced by the school meals. It is recommended that Government should continue to sponsor the School Feeding Program. The quality of meals should also be improved to include lots of fruits and vegetables. Government should extend the Program to other areas so as to improve enrolment in school, reduce malnutrition and raise the level of education in the country.

REFERENCES

Adelman, S., Gilligan, D. and Lehrer, K. (2008). *How Effective are Food for Education Programs?: A Critical Assessment of the Evidence from Developing Countries.* (Volume 9). International Food Policy Research Institute.

Ahmed, A. and Sharma, M. (2004). Food-For-Education Programs with Locally Produced Food: Effects on Farmers and Consumers in Sub-Saharan Africa. *Washington: International Food Policy Research Institute.*

Akanbi, G.O. and Alayande, E. (2013). Home Grown School Feeding and Health Programme in Nigeria: An Innovative Approach to Boosting Enrolment in Public Primary Schools– A Study of Osun State, 2002–2010. In *African Symposium* 11(2): 8-12.

Ayehu, S.M. and Sahile, A.T. (2021). Body Mass Index and Associated Factors of School Absenteeism by School Feeding Program at Selected Primary Schools in Addis Ababa, Ethiopia: A Comparative Study. *Scientifica*, 2021. https://doi.org/10.1155/2021/6671468

Ayoola, R.A. (2014). Impact Evaluation of School Feeding Programme in Osun State Primary Schools (Doctoral dissertation). Retrieved from http://ir.library.ui.edu.ng/handle/12345678/3569

Banwat, M.E., Fayenuwo, J.O., Pamtok, A.O., ... and Zoakah, A.I. (2018). Comparing Dietary Practices and Nutritional Status of Children on School Feeding Programme with others in Jos North Local Government Area, Plateau state. *Journal of Epidemiological Society of Nigeria,* 1(2): 59-66.

Black, R.E., Allen, L.H., Bhutta, Z.A., ... and Rivera, J. (2008). Maternal and Child Undernutrition: Global and Regional Exposures and Health Consequences. *The Lancet,* 371(9608): 243-260.

Bundy, D.A. (2009). *Rethinking School Feeding: Social Safety Nets, Child Development, and the Education sector.* The World Bank. Available at https://docs.wfp.org/api/documents/WFP-0000020650/download/.Google Scholar

Buttenheim, A.M., Alderman, H. and Friedman, J. (2011). Impact Evaluation of School Feeding Programs in Lao PDR. *World Bank Policy Research Working Paper,* (5518).

Dahab, R., Bécares, L., and Brown, M. (2020). Armed Conflict as a Determinant of Children Malnourishment: A Cross-Sectional Study in The Sudan. *Boston Medical Center Public Health,* 20: 1-10.

Davis, W., Kreisman, D., and Musaddiq, T. (2020). The Effect of Free School Meals on BMI and Student Attendance. GPL Working Papers. 2. doi: https://doi.org/10.57709/ytsa-ct56

Demilew, Y.M. and Nigussie, A.A. (2020). The Relationship between School Meals with Thinness and Stunting among Primary School Students, in Meket Wereda, Ethiopia: Comparing Schools with Feeding and Non-Feeding Program. *Boston Medical Center Nutrition,* 6(34): 1-10.

Denstel, K.D., Broyles, S.T., Larouche, … and Katzmarzyk, P. T. (2015). Active School Transport and Weekday Physical Activity in 9–11-Year-Old Children from 12 Countries. *International Journal of Obesity Supplements*, 5(2): 100-106.

Desalegn, T., Gebremedhin, S. and Stoecker, B. (2022). Successes and Challenges of the Home-Grown School Feeding Program in Sidama Region, Southern Ethiopia: A Qualitative Study. *Journal of Nutritional Science,* 11: E87. doi:10.1017/jns.2022.77

Dreze, J. and Goyal, A. (2003). Future of Mid-Day Meals. *Economic and Political Weekly,* 38(44): 4673-4683.

Eluya, M. (2019). Dietary intake and nutritional status of primary school children participating in the Botswana school feeding programme, South-east District, Botswana (Doctoral dissertation). Retrieved from https://ukzn-dspace.ukzn.ac.za/handle/10413/18286

Finan, T., Rashid, A., Woel, B., Arunga, S., Rutere, S. and Muindi, M. (2010). Impact Evaluation of WFP School Feeding Programmes in Kenya (1999-2008): A Mixed-Methods Approach. *Rome: World Food Programme.*
Food and Agricultural Organization (2017). State of food security and nutrition in the World

Gelli, A., Aurino, E., Folson, G., … and Alderman, H. (2019). A School Meals Program Implemented at Scale in Ghana Increases Height-For-Age During Mid childhood in Girls and in Children from Poor Households: A Cluster Randomized Trial. *The Journal of nutrition,* 149(8): 1434-1442.

Grantham-McGregor, S. M., Chang, S. and Walker, S. P. (1998). Evaluation of School Feeding Programs: Some Jamaican Examples. *The American journal of clinical nutrition,* 67(4): 785-789.

Gutama, M. (2017). Nutritional Status and School Performance of Children Benefited from School Feeding Program in Selected Elementary School, Arada Sub City, Addis Ababa, Ethiopia. Available at http://213.55.95.56/handle/123456789/1447.

Hall, A., Hanh, T.T.M., Farley, K., Quynh, T.P.N and Valdivia, F. (2007) An Evaluation of the Impact of a School Nutrition Programme in Vietnam: *Public Health Nutrition,* 10(8): 819–826.

Hofferth, S.L. and Curtain, S. (2005). Poverty, Food Programs and Childhood Obesity. *Journal of Policy Analysis and Management,* 24(4): 703-726.

Iyalomhe, S.I., Iyalomhe, S.E., Nwadike, I.G., Osunde, R.N. and Iyalomhe, G.B.S. (2018). Assessment of Dietary Habits and Nutritional Status of Adolescents in a Resource–Poor Environment in Nigeria. *International Journal of Nutrition and Food Sciences,* 7(4): 121-128.

Jomaa, L.H., McDonnell, E. and Probart, C. (2011). School Feeding Programs in Developing Countries: Impacts on Children's Health and Educational Outcomes. Nutr Rev, 69(2): 83-98.

Jumare, D. M. (2020). Effect of School Feeding Programme on Enrolment and Retention of Public Primary School Pupils in Selected Local Governments in Kaduna State, Nigeria (2015 2019). *Gombe Journal of Administration and Management,* 3(1): 196-211.

Kano State Ministry of Education (KSMOE). (2022). *Annual School Census Report 2021/22,* Government printers, Kano.

Kwabla, M.P., Gyan, C. and Zotor, F. (2018). Nutritional Status of In-School Children and its Associated Factors in Denkyembour District, Eastern Region, Ghana: Comparing Schools with Feeding and Non-school Feeding Policies. *Nutrition Journal,* 17(8): 1- 8.

Lannotti, L., Dulience, S. J. L., Joseph, S., ... and Wolff, P. B. (2016). Fortified Snack Reduced Anemia in Rural School-Aged Children of Haiti: A Cluster-Randomized, Controlled Trial. *PloS one,* 11(12): e0168121.

Lawson, T.M. (2012). Impact of School Feeding Programs on Educational, Nutritional, and Agricultural Development Goals: A Systematic Review of Literature. Available at https://www.semanticscholar.org/paper/

Maijo, S.N (2018). Impact of School Feeding Programme on Learners' Academic Performance in Mlunduzi Ward, Tanzania. *International Journal of Educational Studies,* 5(3): 125-130.

Malongane, F. and Mbhenyane, X.G. (2017). Nutritional Status of Children on the National School Nutrition Programme in Capricorn District, Limpopo Province, South Africa. *South African Journal of Child Health,* 11(1): 11-15.

McMichael, P. (2005). Global Development and the Corporate Food Regime. In *New Directions in the Sociology of Global Development.* Emerald Group Publishing Limited.

Mohammed, B., Belachew, T., Kedir, S. and Abate, K. H. (2023). Effect of School Feeding Program on Body Mass Index of Primary School Adolescents in Addis Ababa, Ethiopia: A Prospective Cohort Study. *Frontiers in Nutrition,* 9:1026436. doi:10.3389/fnut.2022.102643.

Mwaniki, E.W. and Makokha, A.N. (2013). Nutrition Status and Associated Factors among Children in Public Primary Schools in Dagoretti, Nairobi, Kenya. *African Health Sciences,* 13(1): 38-46.

Naicker, N., Mathee, A. and Teare, J. (2015). Food Insecurity in Households in Informal Settlements in Urban South Africa. *South African Medical Journal*, 105(4): 268-270.

Nowsin, I., Begum, N., Akbar, E. B. and Alam, M. M. (2014). Study on Nutritional Status of Rural School Children of Bangladesh. *Bangladesh Journal of Physiology and Pharmacology*, 30(1): 6-10.

Olumuyiwa, S.F., Israel, O., Oluwemimo, O., Wale, O. and Steve, A.A. (2012). School Feeding Programme in Nigeria: The Nutritional Status of Pupils in a Public Primary School in Ile-Ife, Osun State, *Nigeria. Food and Nutrition Sciences*, 3(5): 596-605.

Ogunnaike, M., Kehinde, M. and Olabode, O. (2021). Determinants of Malnutrition among Children in Rural Farm Households in Ogun State, Nigeria, *FUDMA Journal of Sciences*, 4(4): 90-95. https://doi.org/10.33003/fjs-2020-0404-341

Oyefade S.A. (2014). Administration of Home-Grown School Feeding & Health Programme in Osun State. Unpublished MPA Thesis, Department of Public Administration, Faculty of Administration, Obafemi Awolowo University, Ile-Ife, Osun, Nigeria.

Pelletier, D.L. (1994). The Potentiating Effects of Malnutrition on Child Mortality: Epidemiologic Evidence and Policy Implications. *Nutrition Reviews*, 52: 409–415.

PERL (2016) Macro Political Economy Analysis Summaries, Internal Document Submitted to DFID, written by the Partnership to Engage, Reform and Learn (PERL).

Powell, C. A., Walker, S. P., Chang, S. M. and Grantham-McGregor, S. M. (1998). Nutrition and Education: A Randomized Trial of the Effects of Breakfast in Rural Primary School Children. *The American journal of clinical nutrition*, 68(4): 873-879.

Prince, A. K., & Laar, A. (2014). Nutritional Status of School-Age Children in the Nkwanta South District -Volta Region of Ghana. *European Scientific Journal*, 10: 30.

Rocha, N. P., Filgueiras, M. D. S., Albuquerque, F. M. D., ... and Novaes, J. F. D. (2018). Analysis of the National School Feeding Program in the Municipality of Viçosa, State of Minas Gerais. *Revista de Saúde Pública*, 52: 16.

Sarmiento, O. L., Lemoine, P., Gonzalez, S. A., Broyles, S. T., Denstel, K. D., Larouche, R., ... & Katzmarzyk, P. T. (2015). Relationships Between Active School Transport and Adiposity Indicators in School-Age Children from Low-, Middle-and High-Income Countries. *International Journal of Obesity Supplements*, 5(2): 107-114.

Shree, A. and Murthy, M. N. (2021). Impact of Malnutrition on Scholastic Performance among School Children in Mysuru. *Clinical Epidemiology and Global Health*, 11: 100780.

Simeon, D.T. and Grantham, M. S. (1990). Effects of Missing Breakfast on the Cognitive Functions of School Children of Differing Nutritional Status. *American Journal of Clinical Nutrition*, 49: 646-53.

Tamiru, D. and Belachew, T. (2017). The Association of Food Insecurity and School Absenteeism: Systematic Review. *Agriculture and food security*, 6(1): 1-4.

Taylor, A. D. and Ogbogu, C. O. (2016). The Effects of School Feeding Programme on Enrolment and Performance of Public Elementary School Pupils in Osun State, Nigeria. *World Journal of Education*, 6: 3.
UNICEF. (2007). Toward Effective Programme for WASH in Schools, UNICEF, New York.

Wang, D. and Fawzi, W.W. (2020). Impacts of School Feeding on Educational and Health Outcomes of School-Age Children and Adolescents in Low-and Middle-Income Countries: Protocol for a Systematic Review and Meta-Analysis. *Systematic Reviews*, 9(1): 1-8.

Wang, D., Shinde, S., Young, T. and Fawzi, W.W. (2021). Impacts of School Feeding on Educational and Health Outcomes of School-Age Children and Adolescents in Low-and Middle-Income Countries: A Systematic Review and Meta-Analysis. *Journal of Global Health*, 11: 04051.

Watkins, K., Gelli, A., Hamdani, S., Masset, E., Mersch, C., Nadazdin, N. and Vanhees, J. (2015). Sensitive to Nutrition? A Literature Review of School Feeding Effects in the Child Development Lifecycle. *Working Paper Series# 16.*

Yussif, M.T., Adocta, V.A., Apprey, C., Annan, R.A. and Galseku, P. (2022). School Feeding Programmes and Physical Nutrition Outcomes of Primary School Children in Developing Countries. *MedRxiv*, 2022-04.

Zenebe, M., Gebremedhin, S., Henry, C. J. and Regassa, N. (2018). School Feeding Program Has Resulted in Improved Dietary Diversity, Nutritional Status and Class Attendance of School Children. *Italian journal of Pediatrics*, 44: 1-7.