

# Impact of School Feeding on School Enrollment in the Tolon District, Ghana

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## Abstract

This study evaluated the impact of school feeding programmes on enrollment in the Tolon District of Ghana. The research analyzed data from seven schools with feeding programmes and compared it with data from seven schools without feeding programmes. The data underwent logarithm transformation and was analyzed using ANOVA. The study found an increase in the number of schools with feeding programmes in the district over the past three years, but no significant correlation between enrollment numbers and school feeding was observed. Nonetheless, the study suggests that school feeding programmes have the potential to enhance students' nutritional status and improve academic performance. The provision of these local meals could contribute to teaching pupils the rich culture of Ghana through food. The procurement of local ingredients for the meals could help increase the income of farmers, aggregators and processors along the value chain.

## Keywords

School, Population, Enrollment Number, Pupil Nutrition, Correlation

## 1. Introduction

School feeding programmes are essential in children's psychological formation and performance at all levels of education. School feeding programmes can potentially increase enrollment numbers in some schools and are essential in children's psychological formation and academic performance at all levels of education. In 2005, the Ghana School Feeding Programme (GSFP) was introduced and has since been implemented as a social protection strategy across all 216 districts in Ghana, with a target of approximately 4952 primary schools (GSFP, 2015) and 1,642,271 school children and improve enrollment in schools. The programme is implemented by the Ministry of Gender, Children, and Social Protection and aims to

ensure that every school-going child in Ghana is provided with a nutritious meal.

Malnutrition occurs when nutrient and energy intake does not meet or exceed an individual's requirements to maintain growth, immunity and organ function. Malnutrition is a general term that covers both undernutrition (deficiency) and overnutrition (excess). Malnutrition can manifest in many forms, including undernutrition (indicated by wasting, stunting, and underweight), vitamin or mineral deficiency (inadequacy), overweight, obesity, and other types of excess intake that cause diet-related non-communicable diseases (WHO, 2018). According to WHO (2018), 50.5 million children under age five were wasted in 2017, of whom 16 million were severely wasted. As a result, 150.8 million (22.2%) children under five suffered from stunting in 2017. Also, more than half of all stunted children under age 5 live in Asia, and more than one-third in Africa (IFPRI, 2017). Africa is the only region where the number of stunted children has increased since 2000, from 50.5 million to 58.2 million (IFPRI, 2017; UNICEF/WHO/WB, 2018). Micronutrient food served to pupils is known to nourish the brain and improve the intelligence of children (pupils), which will lead to quality education. The success of the school feeding programmes will culminate in achieving the sustainable development goal four (4) of the United Nations in Sub-Saharan Africa. Malnutrition remains a persistent issue in many developing countries, including Ghana, and has a significant impact on the cognitive and physical growth of children. According to other researchers, school absenteeism was reduced, and food sovereignty was improved in schools with feeding programmes in East and Southern Africa (Mungai, 2004; Tomlinson, 2007; Kearney, 2008; Githuku, 2015). GSFP thus has the potential to increase enrollment numbers in schools, improve the nutritional status of pupils, and ultimately lead to better academic performance. The purpose of this study was to examine the impact of the school feeding programme on school enrollment in the Tolon District of Ghana for the 2018/2019, 2020, and 2021 academic years.

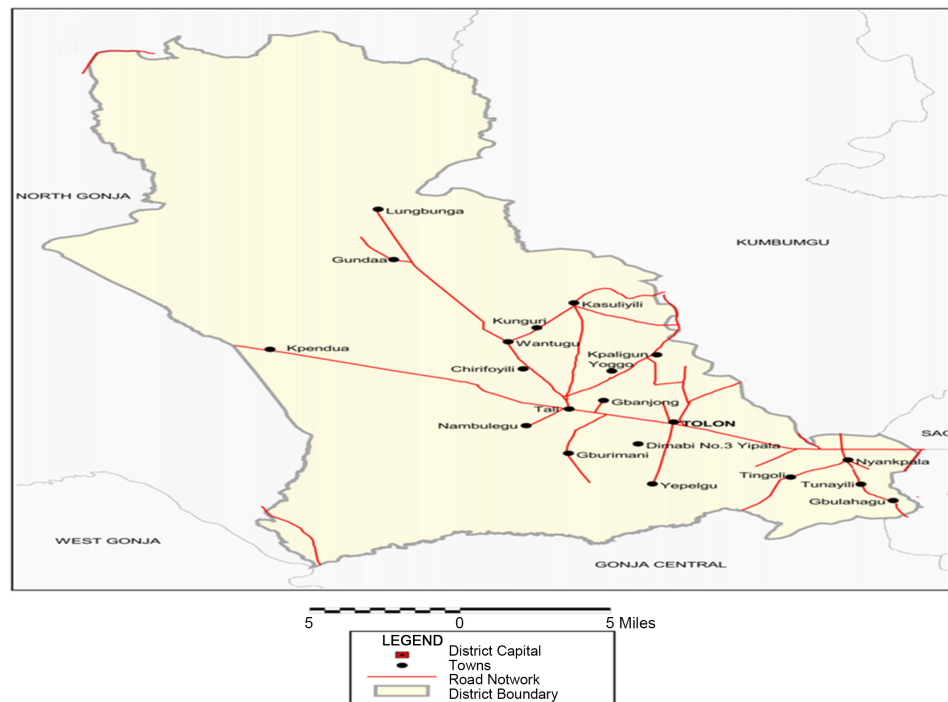
## 2. Materials and Methods

### 2.1. Study Area

The Tolon District is located at the coordinates 9°25'51.6"N 1°3'53.64"W in the Northern Region of Ghana. It was formerly part of the larger Tolon-Kumbungu District that was established in 1988, which included the district capital. In 2012, the eastern part of the district was split off to form the Kumbungu District, and the remaining part became the Tolon District (Figure 1) with Tolon as its capital. The district is divided into seven educational circuits, namely Nyankpala West, Nyankpala East, Tali, Kasuliyili, Tolon West, Tolon East, and Lungbung, and is overseen by the Ghana education service.

### 2.2. Sampling Technique and Data Collection

The enrollment data for schools participating in the school feeding programme during the academic years 2018/2019, 2020, and 2021 were analyzed to assess their performance in the seven educational circuits of the district. Furthermore,



**Figure 1.** Map of Tolon District (GSS, 2011).

seven schools that did not participate in the school feeding programme within the seven educational circuits were chosen at random and used as a control group. The menu served at the schools was also examined to determine the quality of the meals and their impact on the academic performance of students participating in the school feeding programme.

### 2.3. Data Analysis

Differences in enrollment in schools for the stated periods were calculated and presented using frequencies and percentages. The count data was converted into continuous data using logarithm transformation. Analysis of variance (ANOVA) was performed using XLSTAT 2016.

## 3. Results and Discussion

### 3.1. Number of School Feeding Schools in the District

The number of schools participating in the school feeding programme grew over the 2018/2019, 2020, and 2021 academic years, rising from 20 to 33 schools, which represented a 65% increase with the addition of 15 schools in 2020 and 2021 (**Table 1** and **Table 2**). However, two schools, Gbanjong AME Zion primary school and Kuriguvuhuyayili E/A primary school, were not included in the list for 2020 and 2021, despite being present in the 2018/2019 academic year.

Of the seven educational circuits in the district, the largest number of schools were in Tolon West with nine, followed by Nyankpala West with seven, Tolon East with six, and Kasuliyili with five. Lungbung, Nyankpala East, and Tali each had two schools.

### 3.2. Enrollment for School Feeding and Non-School Feeding Schools for the Timeframe

The enrollment data varied over the three academic years presented in **Table 3(a)**, **Table 3(b)** and **Table 4(a)**, **Table 4(b)**. There were differences within schools, between schools within circuits, and between circuits. Therefore, the changes in enrollment cannot be categorized as increases or decreases in the schools listed. The effect of school feeding programmes on learning seemed to come from improved school attendance and increased learning efficiency while at school.

Research on the impact of a school feeding programme in Burkina Faso found that school canteens led to higher enrollment, better attendance, reduced repetition rates, reduced dropout rates in disadvantaged areas, and higher exam success rates, particularly for girls (Moore, 1994).

### 3.3. Comparison of Enrollments of School Feeding Schools with Non-School Feeding Schools

There were variations both within and between schools that participated in school feeding programmes and those that do not. Notably, schools that had feeding programmes (**Table 5**) had significant differences in enrollment numbers between the 2018/2019 academic year and the 2020 and 2021 academic years. However, there were no significant differences in enrollment numbers between the 2020 and 2021 academic years for all levels.

**Table 1.** List of school feeding schools for the 2018/2019 academic year.

1	Dabogshie D/A Primary School
2	Fihini A.M.E Zion Primary School
3	Gbanjogla D/A Primary
4	Gbullahagu A.M.E Zion Primary
5	Gburimani Ahmadiyya Primary School
6	Kangbagu S.D.A Primary School
7	Kasuliyili R/C Primary School
8	Koblimahigu D/A Primary School
9	Kpachiyili D/A Primary School
10	Kpaligun A.M.E Zion Kg, Primary School
11	Lungbung-Gurugu A.M.E Zion Primary School
12	Tali E/A Kg, Primary School
13	Wantugu R/C Kg, Primary School
14	Woribogu Kukuo Ahmadiya Primary School
15	Yipelgu A.M.E Zion Primary School
16	Yobzeri D/A Primary School
17	Kpalsogu A.M.E Zion Primary School
18	Gbanjong A.M.E Zion Primary School
19	Wayamba A.M.E Zion Primary
20	Kuriguvuhuyayili E/A Kg, Primary School

**Table 2.** List of school feeding schools for the 2020 and 2021 academic years.

	<b>School</b>	<b>Circuit</b>
1	Nawaria English Arabic School	Nyankpala West
2	Nyankpala D/A Primary School	Nyankpala West
3	Gurumanchayili English Arabic School	Nyankpala West
4	Kpalsogu AME Zion School	Nyankpala West
5	Nyankpala D/A Primary B School	Nyankpala West
6	Nyankpala Nizamia E/A School	Nyankpala West
7	St. Monica's R/C Primary School	Nyankpala West
8	Gbullahagu AME Zion School	Nyankpala East
9	Koblimahigu D/A School	Tali
10	Tali E/A School	Tali
11	Kangbagu SDA School	Kasuliyili
12	Kasuliyili R/C School	Kasuliyili
13	Wantugu R/C School	Kasuliyili
14	Kunguri D/A School	Kasuliyili
15	Wayamba AME Zion School	Kasuliyili
16	Kpaligun AME Zion School	Tolon West
17	Woribogu Kukuo Ahmadiya School	Tolon West
18	Gburimani Ahmadiya School	Tolon West
19	Yipelgu AME Zion School	Tolon West
20	Yobzeri AME Zion School	Tolon West
21	Fihini AME Zion School	Tolon West
22	Kpachiyili D/A School	Tolon West
23	Dabogshie D/A School	Tolon East
24	Gbanjogla D/A School	Lungbung
25	Lungbung-Gurugu AME Zion School	Lungbung
26	Dimabi D/A School	Tolon West
27	Yoggu D/A School	Tolon West
28	Tolon D/A A School	Tolon East
29	Tolon D/A B School	Tolon East
30	Tolon Model School	Tolon East
31	Nyankpala Islamia School	Nyankpala East
32	Gburimani-Tibogu D/A School	Tolon East
33	Tolon Irishadiya E/A School	Tolon East

**Table 3.** (a). Enrollment Differences for the period under school feeding schools—Kindergarten One to Primary Two (KG 1 - P 2); (b). Enrollment Differences for the period under school feeding schools—Primary Three to Primary Six (P 3 - P 6).

(a)

	School	Circuit	KG1.19	KG1.20	KG1.21	Df 19/20	Df 20/21	KG2.19	KG2.20	KG2.21	Df 19/20	Df 20/21	P1.19	P1.20	P1.21	Df 19/20	Df 20/21	P2.19	P2.20	P2.21	Df 19/20	Df 20/21
1	Nawaria English Arabic Sch	Nyankpala West	41	33	41	-8		37	33	37	-4		39	23	39	-16		32	27	32	-5	
2	Nyankpala D/A Primary Sch	Nyankpala West	112	109	112	-3		81	112	81	31		123	98	123	-25		101	110	101	9	
3	Gurumanchayili English Arabic Sch	Nyankpala West	53	47	53	-6		33	21	33	-12		36	29	36	-7		22	22	22	0	
4	Kpalsogu AME Zion Sch	Nyankpala West	55	50	54	-5	4	27	44	38	17	-6	36	29	41	-7	12	34	36	33	2	-3
5	Nyankpala D/A Primary B Sch	Nyankpala West	70	42	70	-28		39	43	39	4		43	48	43	5		46	61	46	15	
6	Nyankpala Nizamia E/A Sch	Nyankpala West	84	130	84	46		40	50	40	10		35	55	35	20		39	41	39	2	
7	St. Monica's R/C Primary Sch	Nyankpala West	116	140	116	24		83	70	83	-13		78	74	78	-4		91	109	91	18	
8	Gbullahagu AME Zion Sch	Nyankpala East	176	136	150	-40	14	100	78	104	-22	26	77	95	83	18	-12	86	71	75	-15	4
9	Koblimahigu D/A Sch	Tali	54	65	99	11	34	42	60	40	18	-20	36	39	46	3	7	32	29	45	-3	16
10	Tali E/A Sch	Tali	132	114	50	-18	-64	44	53	34	9	-19	55	51	72	-4	21	28	60	61	32	1
11	Kangbagu SDA Sch	Kasuliyili	88	95	59	7	-36	21	42	37	21	-5	16	41	33	25	-8	22	15	34	-7	19
12	Kasuliyili R/C Sch	Kasuliyili	86	102	140	16	38	57	73	67	16	-6	56	58	61	2	3	39	57	55	18	-2
13	Wantugu R/C Sch	Kasuliyili	95	131	109	36	-22	45	45	66	0	21	54	40	51	-14	11	72	52	43	-20	-9
14	Kunguri D/A Sch	Kasuliyili	176	68	176	-108		43	45	43	2		28	36	28	8		43	33	43	-10	
15	Wayamba AME Zion Sch	Kasuliyili	70	43	37	-27	-6	20	25	38	5	13	36	36	30	0	-6	10	30	26	20	-4
16	Kpaligun AME Zion Sch	Tolon West	152	175	90	23	-85	45	57	57	12	0	55	38	59	-17	21	50	47	35	-3	-12
17	Woribogu Kukuo Ahmadiya Sch	Tolon West	110	85	72	-25	-13	36	41	36	5	-5	23	38	72	15	34	31	24	56	-7	32
18	Gburimani Ahmadiya Sch	Tolon West	104	120	115	16	-5	99	140	98	41	-42	78	100	91	22	-9	107	84	82	-23	-2
19	Yipelgu AME Zion Sch	Tolon West	128	149	82	21	-67	48	34	58	-14	24	23	43	63	20	20	40	26	45	-14	19
20	Yobzeri AME Zion Sch	Tolon West	35	66	77	31	11	23	29	57	6	28	30	29	49	-1	20	29	16	26	-13	10
21	Fihini AME Zion Sch	Tolon West	82	51	50	-31	-1	23	27	37	4	10	34	35	25	1	-10	23	21	30	-2	9
22	Kpachiyili D/A Sch	Tolon West	52	74	65	22	-9	22	31	25	9	-6	30	28	30	-2	2	23	22	28	-1	6
23	Dabogshie D/A Sch	Tolon East	95	65	59	-30	-6	50	95	40	45	-55	50	50	50	0	0	25	57	45	32	-12
24	Gbanjogla D/A Sch	Lungbung	33	70	59	37	-11	38	50	37	12	-13	34	37	27	3	-10	12	22	33	10	11
25	Lungbung-Gurugu AME Zion Sch	Lungbung	60	36	26	-24	-10	60	37	36	-23	-1	54	32	48	-22	16	38	35	27	-3	-8
26	Dimabi D/A Sch	Tolon West	160	151	160	-9		100	131	100	31		50	153	50	103		51	91	51	40	
27	Yoggu D/A Sch	Tolon West	100	120	100	20		57	134	57	77		50	77	50	27		59	112	59	53	
28	Tolon D/A A Sch	Tolon East	91	64	91	-27		63	51	63	-12		42	42	42	0		44	64	44	20	
29	Tolon D/A B Sch	Tolon East	137	68	137	-69		86	64	86	-22		58	87	58	29		59	72	59	13	
30	Tolon Model Sch	Tolon East	55	77	55	22		44	82	44	38		53	64	53	11		54	66	54	12	
31	Nyankpala Islamia Sch	Nyankpala East	0	69	0	69		0	67	0	67		65	65	65	0		46	46	46	0	
32	Gburimani-Tibogu D/A Sch	Tolon East	0	96	0	96		0	84	0	84		39	39	39	0		34	34	34	0	
33	Tolon Irishadiya E/A Sch	Tolon East	63	103	63	40		62	28	62	-34		27	20	27	-7		19	28	19	9	
			<b>2885</b>	<b>2710</b>	<b>1278</b>	<b>-175</b>	<b>800</b>	<b>1729</b>	<b>1920</b>	<b>929</b>	<b>191</b>	<b>777</b>	<b>1585</b>	<b>1841</b>	<b>808</b>	<b>256</b>	<b>701</b>	<b>1444</b>	<b>1695</b>	<b>743</b>	<b>251</b>	

(b)

	School	Circuit	P3. 19	P3. 20	P3. 21	Df 19/20	Df 20/21	P4. 19	P4. 20	P4. 21	Df 19/20	Df 20/21	P5. 19	P5. 20	P5. 21	Df 19/20	Df 20/21	P6. 19	P6. 20	P6. 21	Df 19/20	Df 20/21
1	Nawaria English Arabic Sch	Nyankpala West	34	22	34	-12		33	24	33	-9		35	20	35	-15		20	20	20	0	
2	Nyankpala D/A Primary Sch	Nyankpala West	77	155	77	78		122	99	122	-23		116	83	116	-33		101	102	101	1	
3	Gurumanchayili English Arabic Sch	Nyankpala West	17	35	17	18		17	22	17	5		14	15	14	1		18	14	18	-4	
4	Kpalsogu AME Zion Sch	Nyankpala West	31	35	35	4	0	32	26	31	-6	5	23	31	35	8	4	24	22	28	-2	6
5	Nyankpala D/A Primary B Sch	Nyankpala West	58	28	58	-30		54	40	54	-14		54	56	54	2		49	47	49	-2	
6	Nyankpala Nizamia E/A Sch	Nyankpala West	42	43	42	1		50	38	50	-12		43	40	43	-3		44	47	44	3	
7	St. Monica's R/C Primary Sch	Nyankpala West	101	96	101	-5		118	98	118	-20		91	94	91	3		105	116	105	11	
8	Gbullahagu AME Zion Sch	Nyankpala East	58	80	110	22	30	54	56	75	2	19	24	39	73	15	34	30	33	50	3	17
9	Koblimahigu D/A Sch	Tali	24	33	39	9	6	18	18	25	0	7	14	14	20	0	6	20	10	13	-10	3
10	Tali E/A Sch	Tali	24	24	56	0	32	23	23	55	0	32	29	24	26	-5	2	24	29	24	5	-5
11	Kangbagu SDA Sch	Kasuliyili	25	19	29	-6	10	11	24	11	13	-13	15	10	16	-5	6	13	12	20	-1	8
12	Kasuliyili R/C Sch	Kasuliyili	47	35	48	-12	13	59	45	42	-14	-3	39	61	46	22	-15	36	34	53	-2	19
13	Wantugu R/C Sch	Kasuliyili	54	68	37	14	-31	41	45	43	4	-2	41	41	34	0	-7	35	34	34	-1	0
14	Kunguri D/A Sch	Kasuliyili	32	31	32	-1		31	40	31	9		31	30	31	-1		25	30	25	5	
15	Wayamba AME Zion Sch	Kasuliyili	18	11	21	-7	10	17	20	23	3	3	17	17	11	0	-6	17	15	17	-2	2
16	Kpaligun AME Zion Sch	Tolon West	46	43	36	-3	-7	31	32	46	1	14	37	35	35	-2	0	36	26	26	-10	0
17	Woribogu Kukuo Ahmadiya Sch	Tolon West	31	34	44	3	10	28	34	19	6	-15	32	21	35	-11	14	16	31	38	15	7
18	Gburimani Ahmadiya Sch	Tolon West	85	124	102	39	-22	51	81	88	30	7	52	41	96	-11	55	36	48	63	12	15
19	Yipelgu AME Zion Sch	Tolon West	40	41	52	1	11	24	32	28	8	-4	28	26	31	-2	5	31	27	32	-4	5
20	Yobzeri AME Zion Sch	Tolon West	25	15	25	-10	10	13	24	12	11	-12	8	7	13	-1	6	8	10	15	2	5
21	Fihini AME Zion Sch	Tolon West	39	19	18	-20	-1	21	38	22	17	-16	21	24	19	3	-5	16	23	38	7	15
22	Kpachiyili D/A Sch	Tolon West	18	16	21	-2	5	17	13	21	-4	8	13	17	15	4	-2	20	12	11	-8	-1
23	Dabogshie D/A Sch	Tolon East	25	28	50	3	22	25	30	48	5	18	25	25	30	0	5	25	35	30	10	-5
24	Gbanjogla D/A Sch	Lungbung	10	17	20	7	3	15	16	14	1	-2	6	18	14	12	-4	8	8	17	0	9
25	Lungbung-Gurugu AME Zion Sch	Lungbung	33	15	34	-18	19	24	17	20	-7	3	24	15	11	-9	-4	18	15	16	-3	1
26	Dimabi D/A Sch	Tolon West	44	56	44	12		39	47	39	8		51	46	51	-5		29	40	29	11	
27	Yoggu D/A Sch	Tolon West	41	71	41	30		55	57	55	2		49	53	49	4		46	66	46	20	
28	Tolon D/A A Sch	Tolon East	60	39	60	-21		60	38	60	-22		48	47	48	-1		38	55	38	17	
29	Tolon D/A B Sch	Tolon East	44	59	44	15		56	56	56	0		46	41	46	-5		31	50	31	19	
30	Tolon Model Sch	Tolon East	72	64	72	-8		58	69	58	11		56	70	56	14		78	59	78	-19	
31	Nyankpala Islamia Sch	Nyankpala East	46	46	46	0		52	52	52	0		60	60	60	0		45	45	45	0	
32	Gburimani-Tibogu D/A Sch	Tolon East	21	21	21	0		25	25	25	0		23	23	23	0		15	15	15	0	
33	Tolon Irishadiya E/A Sch	Tolon East	26	19	26	-7		27	19	27	-8		23	14	23	-9		33	23	33	-10	
			<b>633</b>	<b>1372</b>	<b>1562</b>	<b>739</b>	<b>190</b>	<b>504</b>	<b>1371</b>	<b>1347</b>	<b>867</b>	<b>-24</b>	<b>448</b>	<b>1206</b>	<b>1252</b>	<b>758</b>	<b>46</b>	<b>413</b>	<b>1101</b>	<b>1254</b>	<b>688</b>	<b>153</b>

\*Df represents the difference between the years.

**Table 4.** (a). Enrollment Differences for the period under non-school feeding schools—Kindergarten One to Primary Two (KG 1 - P 2); (b). Enrollment Differences for the period under non-school feeding schools—Primary Three to Primary Six (P3 - P 6).

(a)

	School	Circuit	KG1.		Df	Df		KG2.		Df	Df		P1.		Df	Df		P2.		Df	Df		
			19	20		21	19/20	20/21	19		20	21	19/20	20/21		19	20	21	19/20		20/21	19	20
1	Gbrumani-Tibogu D/A Primary/KG School	Tolon West	70	86	91	16	5	42	57	66	15	9	26	32	39	6	7	24	23	34	-1	11	
2	Nyankpala Model KG/Primary Sch	Nyankpala East	60	52	108	-8	56	36	27	96	-9	69	49	39	30	-10	-9	39	43	29	4	-14	
3	Tolon E/A Primary School	Tolon East	25	22	86	-3	64	26	30	94	4	64	39	28	29	-11	1	42	39	24	-3	-15	
4	UDS Basic School	Nyankpala West	19	26	80	7	54	14	16	62	2	46	13	19	31	6	12	8	14	24	6	10	
5	Walishie D/A Primary Sch	Lungbung	21	25	54	4	29	18	16	39	-2	23	20	18	22	-2	4	23	13	19	-10	6	
6	Wantugu E/A Primary Sch	Kasuliyili	52	48	68	-4	20	39	46	47	7	1	21	22	22	1	0	39	23	29	-16	6	
7	Zoolanyili E/A Primary Sch	Tali	36	53	155	17	102	45	43	137	-2	94	44	52	52	8	0	49	56	52	7	-4	
			<b>283</b>	<b>312</b>	<b>642</b>	<b>29</b>	<b>330</b>	<b>220</b>	<b>235</b>	<b>541</b>	<b>15</b>	<b>306</b>	<b>212</b>	<b>210</b>	<b>225</b>	<b>-2</b>	<b>15</b>	<b>224</b>	<b>211</b>	<b>211</b>	<b>-13</b>	<b>0</b>	<b>283</b>

(b)

	School	Circuit	P3.		Df	Df		P4.		Df	Df		P5.		Df	Df		P6.		Df	Df		
			19	20		21	19/20	20/21	19		20	21	19/20	20/21		19	20	21	19/20		20/21	19	20
1	Gbrumani-Tibogu D/A Primary/KG School	Tolon West	35	39	21	4	-18	36	19	25	-17	6	23	22	23	-1	1	18	21	15	3	-6	
2	Nyankpala Model KG/Primary Sch	Nyankpala East	27	39	36	12	-3	14	25	40	11	15	0	26	45	26	19	0	14	24	14	10	
3	Tolon E/A Primary School	Tolon East	24	39	27	15	-12	31	43	37	12	-6	25	33	35	8	2	26	23	28	-3	5	
4	UDS Basic School	Nyankpala West	9	12	23	3	11	11	17	24	6	7	5	17	13	12	-4	3	10	18	7	8	
5	Walishie D/A Primary Sch	Lungbung	9	10	28	1	18	15	10	5	-5	-5	3	7	9	4	2	2	4	5	2	1	
6	Wantugu E/A Primary Sch	Kasuliyili	17	25	13	8	-12	21	18	21	-3	3	21	21	18	0	-3	19	21	12	2	-9	
7	Zoolanyili E/A Primary Sch	Tali	42	43	53	1	10		35	56	-21		0	46	0	46		0	33	0	33		
			<b>283</b>	<b>163</b>	<b>207</b>	<b>201</b>	<b>44</b>	<b>-6</b>	<b>128</b>	<b>167</b>	<b>208</b>	<b>-17</b>	<b>20</b>	<b>77</b>	<b>126</b>	<b>189</b>	<b>49</b>	<b>63</b>	<b>68</b>	<b>93</b>	<b>135</b>	<b>25</b>	<b>42</b>

\*Df represents the difference between the years.

**Table 5.** Enrollment according to years for school feeding schools.

Year	KG1	KG2	P1	P2	P3	P4	P5	P6
2018/2019	52 <sup>b</sup>	27 <sup>b</sup>	26 <sup>b</sup>	25 <sup>b</sup>	22 <sup>b</sup>	17 <sup>b</sup>	15 <sup>b</sup>	14 <sup>b</sup>
2020	87 <sup>a</sup>	52 <sup>a</sup>	48 <sup>a</sup>	44 <sup>a</sup>	42 <sup>a</sup>	42 <sup>a</sup>	37 <sup>a</sup>	33 <sup>a</sup>
2021	82 <sup>a</sup>	58 <sup>a</sup>	56 <sup>a</sup>	51 <sup>a</sup>	47 <sup>a</sup>	41 <sup>a</sup>	38 <sup>a</sup>	38 <sup>a</sup>
Pr > F	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

\*Means with different superscripts in the same column represent significant differences.

The results further showed that the enrollment for schools participating in the school feeding programme remained consistent across all levels and educational circuits over the three years, with no significant differences observed (Table 6). However, the enrollment in non-school feeding schools showed some variation. There were no significant differences in enrollment between levels in primary (P1 to P6) in the three academic years, but significant differences were seen in kindergartens 1 and 2 for the academic years 2018/2019, 2020, and 2021 (Table 7).



**Table 6.** Enrollment according to schools for school feeding schools.

School	Circuit	KG1	KG2	P1	P2	P3	P4	P5	P6
Gburimani Ahmadiya	Tolon West	113 <sup>a</sup>	112 <sup>a</sup>	90 <sup>a</sup>	91 <sup>a</sup>	104 <sup>a</sup>	73 <sup>a</sup>	63 <sup>a</sup>	49 <sup>a</sup>
Gbullahagu AME Zion	Nyankpala East	154 <sup>a</sup>	94 <sup>a</sup>	85 <sup>a</sup>	77 <sup>a</sup>	83 <sup>a</sup>	62 <sup>a</sup>	45 <sup>a</sup>	38 <sup>a</sup>
Nyankpala D/A Primary	Nyankpala West	74 <sup>a</sup>	64 <sup>a</sup>	74 <sup>a</sup>	70 <sup>a</sup>	77 <sup>a</sup>	74 <sup>a</sup>	66 <sup>a</sup>	68 <sup>a</sup>
St. Monica's R/C Primary	Nyankpala West	85 <sup>a</sup>	51 <sup>a</sup>	51 <sup>a</sup>	67 <sup>a</sup>	66 <sup>a</sup>	72 <sup>a</sup>	62 <sup>a</sup>	74 <sup>a</sup>
Kasuliyili R/C	Kasuliyili	109 <sup>a</sup>	66 <sup>a</sup>	58 <sup>a</sup>	50 <sup>a</sup>	43 <sup>a</sup>	49 <sup>a</sup>	49 <sup>a</sup>	41 <sup>a</sup>
Wantugu R/C	Kasuliyili	112 <sup>a</sup>	52 <sup>a</sup>	48 <sup>a</sup>	56 <sup>a</sup>	53 <sup>a</sup>	43 <sup>a</sup>	39 <sup>a</sup>	34 <sup>a</sup>
Kpaligun AME Zion	Tolon West	139 <sup>a</sup>	53 <sup>a</sup>	51 <sup>a</sup>	44 <sup>a</sup>	42 <sup>a</sup>	36 <sup>a</sup>	36 <sup>a</sup>	29 <sup>a</sup>
Yoggu D/A	Tolon West	73 <sup>a</sup>	64 <sup>a</sup>	42 <sup>a</sup>	57 <sup>a</sup>	37 <sup>a</sup>	37 <sup>a</sup>	34 <sup>a</sup>	37 <sup>a</sup>
Dimabi D/A	Tolon West	104 <sup>a</sup>	77 <sup>a</sup>	68 <sup>a</sup>	47 <sup>a</sup>	33 <sup>a</sup>	29 <sup>a</sup>	32 <sup>a</sup>	23 <sup>a</sup>
Gburimani-Tibogu D/A	Tolon East	67 <sup>a</sup>	61 <sup>a</sup>	52 <sup>a</sup>	58 <sup>a</sup>	42 <sup>a</sup>	34 <sup>a</sup>	33 <sup>a</sup>	22 <sup>a</sup>
Tolon Model	Tolon East	44 <sup>a</sup>	42 <sup>a</sup>	39 <sup>a</sup>	40 <sup>a</sup>	45 <sup>a</sup>	42 <sup>a</sup>	42 <sup>a</sup>	46 <sup>a</sup>
Dabogshie D/A	Tolon East	73 <sup>a</sup>	62 <sup>a</sup>	50 <sup>a</sup>	42 <sup>a</sup>	34 <sup>a</sup>	34 <sup>a</sup>	27 <sup>a</sup>	30 <sup>a</sup>
Tali E/A	Tali	99 <sup>a</sup>	44 <sup>a</sup>	59 <sup>a</sup>	50 <sup>a</sup>	35 <sup>a</sup>	34 <sup>a</sup>	26 <sup>a</sup>	26 <sup>a</sup>
Yipelgu AME Zion	Tolon West	120 <sup>a</sup>	47 <sup>a</sup>	43 <sup>a</sup>	37 <sup>a</sup>	44 <sup>a</sup>	28 <sup>a</sup>	28 <sup>a</sup>	30 <sup>a</sup>
Tolon D/A B	Tolon East	68 <sup>a</sup>	50 <sup>a</sup>	48 <sup>a</sup>	44 <sup>a</sup>	34 <sup>a</sup>	37 <sup>a</sup>	29 <sup>a</sup>	27 <sup>a</sup>
Woribogu Kukuo Ahmadiya	Tolon West	89 <sup>a</sup>	38 <sup>a</sup>	44 <sup>a</sup>	37 <sup>a</sup>	36 <sup>a</sup>	27 <sup>a</sup>	29 <sup>a</sup>	28 <sup>a</sup>
Tolon D/A A	Tolon East	52 <sup>a</sup>	38 <sup>a</sup>	28 <sup>a</sup>	36 <sup>a</sup>	33 <sup>a</sup>	33 <sup>a</sup>	32 <sup>a</sup>	31 <sup>a</sup>
Nyankpala Islamia	Nyankpala East	23 <sup>a</sup>	22 <sup>a</sup>	43 <sup>a</sup>	31 <sup>a</sup>	31 <sup>a</sup>	35 <sup>a</sup>	40 <sup>a</sup>	30 <sup>a</sup>
Kpalsogu AME Zion School	Nyankpala West	53 <sup>a</sup>	36 <sup>a</sup>	35 <sup>a</sup>	34 <sup>a</sup>	34 <sup>a</sup>	30 <sup>a</sup>	30 <sup>a</sup>	25 <sup>a</sup>
Nyankpala D/A Primary B	Nyankpala West	37 <sup>a</sup>	27 <sup>a</sup>	30 <sup>a</sup>	36 <sup>a</sup>	29 <sup>a</sup>	31 <sup>a</sup>	37 <sup>a</sup>	32 <sup>a</sup>
Nyankpala Nizamia E/A	Nyankpala West	71 <sup>a</sup>	30 <sup>a</sup>	30 <sup>a</sup>	27 <sup>a</sup>	28 <sup>a</sup>	29 <sup>a</sup>	28 <sup>a</sup>	30 <sup>a</sup>
Koblimahigu D/A	Tali	73 <sup>a</sup>	47 <sup>a</sup>	40 <sup>a</sup>	35 <sup>a</sup>	32 <sup>a</sup>	20 <sup>a</sup>	16 <sup>a</sup>	14 <sup>a</sup>
Lungbung-Gurugu AME Zion	Lungbung	41 <sup>a</sup>	44 <sup>a</sup>	45 <sup>a</sup>	33 <sup>a</sup>	27 <sup>a</sup>	20 <sup>a</sup>	17 <sup>a</sup>	16 <sup>a</sup>
Fihini AME Zion	Tolon West	61 <sup>a</sup>	29 <sup>a</sup>	31 <sup>a</sup>	25 <sup>a</sup>	25 <sup>a</sup>	27 <sup>a</sup>	21 <sup>a</sup>	26 <sup>a</sup>
Kunguri D/A	Kasuliyili	81 <sup>a</sup>	29 <sup>a</sup>	21 <sup>a</sup>	25 <sup>a</sup>	21 <sup>a</sup>	24 <sup>a</sup>	20 <sup>a</sup>	18 <sup>a</sup>
Kangbagu SDA	Kasuliyili	81 <sup>a</sup>	33 <sup>a</sup>	30 <sup>a</sup>	24 <sup>a</sup>	24 <sup>a</sup>	15 <sup>a</sup>	14 <sup>a</sup>	15 <sup>a</sup>
Yobzeri AME Zion	Tolon West	59 <sup>a</sup>	36 <sup>a</sup>	36 <sup>a</sup>	24 <sup>a</sup>	22 <sup>a</sup>	16 <sup>a</sup>	9 <sup>a</sup>	11 <sup>a</sup>
Kpachiyili D/A	Tolon West	64 <sup>a</sup>	26 <sup>a</sup>	29 <sup>a</sup>	24 <sup>a</sup>	18 <sup>a</sup>	17 <sup>a</sup>	15 <sup>a</sup>	14 <sup>a</sup>
Wayamba AME Zion	Kasuliyili	50 <sup>a</sup>	28 <sup>a</sup>	34 <sup>a</sup>	22 <sup>a</sup>	17 <sup>a</sup>	20 <sup>a</sup>	15 <sup>a</sup>	16 <sup>a</sup>
Gbanjogla D/A	Lungbung	54 <sup>a</sup>	42 <sup>a</sup>	33 <sup>a</sup>	22 <sup>a</sup>	16 <sup>a</sup>	15 <sup>a</sup>	13 <sup>a</sup>	11 <sup>a</sup>
Tolon Irishadiya E/A	Tolon East	55 <sup>a</sup>	30 <sup>a</sup>	16 <sup>a</sup>	16 <sup>a</sup>	15 <sup>a</sup>	15 <sup>a</sup>	12 <sup>a</sup>	19 <sup>a</sup>
Nawaria English Arabic	Nyankpala West	25 <sup>a</sup>	23 <sup>a</sup>	21 <sup>a</sup>	20 <sup>a</sup>	19 <sup>a</sup>	19 <sup>a</sup>	18 <sup>a</sup>	13 <sup>a</sup>
Gurumanchayili English	Nyankpala West	33 <sup>a</sup>	18 <sup>a</sup>	22 <sup>a</sup>	15 <sup>a</sup>	17 <sup>a</sup>	13 <sup>a</sup>	10 <sup>a</sup>	11 <sup>a</sup>
Pr > F		0.428	0.590	0.501	0.662	0.635	0.816	0.823	0.919

\*Means with different superscripts in the same column represent significant differences.

**Table 7.** Enrollment according to years for non-school feeding schools.

Year	KG1	KG2	P1	P2	P3	P4	P5	P6
2018/2019	40 <sup>b</sup>	31 <sup>b</sup>	30 <sup>a</sup>	32 <sup>a</sup>	23 <sup>a</sup>	21 <sup>a</sup>	13 <sup>a</sup>	12 <sup>a</sup>
2020	45 <sup>b</sup>	34 <sup>b</sup>	30 <sup>a</sup>	30 <sup>a</sup>	30 <sup>a</sup>	24 <sup>a</sup>	20 <sup>a</sup>	15 <sup>a</sup>
2021	92 <sup>a</sup>	77 <sup>a</sup>	32 <sup>a</sup>	30 <sup>a</sup>	29 <sup>a</sup>	30 <sup>a</sup>	27 <sup>a</sup>	19 <sup>a</sup>
Pr > F	<0.001	<0.001	0.625	0.883	0.326	0.567	0.063	0.083

\*Means with different superscripts in the same column represent a significant difference.

From **Table 8**, there were no significant differences in enrollment between Zoolanyili E/A primary, Tolon E/A primary, Nyankpala Model, Wantugu E/A primary, UDS Basic, and Walishie D/A primary for some grade levels, while significant differences were found in others. For example, there were no differences in enrollment between Tolon E/A primary, Nyankpala Model, and Wantugu E/A primary for kindergarten 2, but there were significant differences with the other schools. Similarly, in primary 1 and 2, there were no differences between Tolon E/A primary and Gbrumani-Tibogu D/A, and within Zoolanyili E/A primary, but significant differences existed within the other schools. Additionally, there were no differences between all primary schools in primary five. However, significant differences occurred between some schools and others, such as between Tolon E/A Primary and Walishie D/A primary for primary 6.

There was no clear evidence of a correlation between the school feeding programme and enrollment figures. For instance, the enrollment figures (**Table 9**) from the UDS basic school, indicate that pupils travel 25 kilometres from Tamale to Nyankpala because of the school's high performance in the Basic School Certificate Examination (BECE). This suggests that parents/guardians did not only consider school feeding in the choice of school but also academic performance.

**Table 8.** Enrollment according to schools for non-school feeding schools.

School	Circuit	KG1	KG2	P1	P2	P3	P4	P5	P6
Zoolanyili E/A Primary	Tali	81 <sup>c</sup>	75 <sup>a</sup>	49 <sup>a</sup>	52 <sup>a</sup>	46 <sup>a</sup>	36 <sup>c</sup>	26 <sup>a</sup>	21 <sup>c</sup>
Tolon E/A Primary	Tolon East	44 <sup>c</sup>	50 <sup>b</sup>	32 <sup>b</sup>	35 <sup>b</sup>	30 <sup>c</sup>	37 <sup>a</sup>	31 <sup>a</sup>	26 <sup>a</sup>
Gbrumani-Tibogu D/A	Tolon West	82 <sup>a</sup>	55 <sup>d</sup>	32 <sup>b</sup>	27 <sup>b</sup>	32 <sup>c</sup>	27 <sup>c</sup>	23 <sup>a</sup>	18 <sup>c</sup>
Nyankpala Model	Nyankpala East	73 <sup>c</sup>	53 <sup>b</sup>	39 <sup>d</sup>	37 <sup>c</sup>	34 <sup>c</sup>	26 <sup>c</sup>	24 <sup>a</sup>	13 <sup>c</sup>
Wantugu E/A Primary	Kasuliyili	56 <sup>c</sup>	44 <sup>b</sup>	22 <sup>e</sup>	30 <sup>b</sup>	18 <sup>c</sup>	20 <sup>c</sup>	20 <sup>a</sup>	17 <sup>c</sup>
UDS Basic	Nyankpala West	42 <sup>b</sup>	31 <sup>c</sup>	21 <sup>c</sup>	15 <sup>c</sup>	15 <sup>b</sup>	17 <sup>c</sup>	12 <sup>a</sup>	10 <sup>c</sup>
Walishie D/A Primary	Lungbung	33 <sup>b</sup>	24 <sup>c</sup>	20 <sup>c</sup>	18 <sup>d</sup>	16 <sup>b</sup>	10 <sup>b</sup>	6 <sup>a</sup>	4 <sup>b</sup>
Pr > F		0.007	0.008	0.002	0.005	0.008	0.036	0.167	0.038

Means with different superscripts in the same column represent significant differences.

**Table 9.** UDS Basic School Pupils distribution based on Location.

S/N	Academic year	Number of Pupils from Tamale		Number of Pupils from Nyankpala		Total number of Pupils
		Number	Percentage	Number	Percentage	
1.	2018/19	50	34.72	94	65.28	144
2.	2020	63	35.00	117	65.00	180
3.	2021	100	44.44	125	55.56	225

### 3.4. Menu of the School Feeding Programme

The findings of this study indicate that the proposed menu (Table 10) for the school feeding programme in the Tolon District can be considered well-balanced and could contribute to meeting Sustainable Development Goal 2 (SDG 2) of ending hunger, achieving food security and improving nutrition, and promoting sustainable agriculture. Despite this, there is still a significant issue of food insecurity globally, with 1 in 3 people lacking regular access to adequate food and nearly 149.2 million children under five suffering from stunted growth, affecting their academic performance (United Nations, 2020). The menu contained local meals prepared using local nutritious ingredients for the health benefit of the pupils and also teach pupils the rich culture of Ghana through food in diverse forms. Farmers, aggregators and processors in the food value chain could also benefit through the employment and income earned. The use of local ingredients collaborated with the study of Upton et al. (2012) in Burkina Faso.

**Table 10.** Proposed menu for schools under the school feeding programme for the district.

Day	Food	Ingredients	Estimated Nutrients
Monday	Gari and beans	Gari, beans, tomato, onion, palm oil, fish and salt	Energy = 36.1 Protein = 47.0 Fat = 38.0 Vitamin A = 52.0 Iron = 29.3
Tuesday	Jollof	Rice, shea butter, onion, salt, dried red pepper, African locust bean seed dried (“ <i>Dawadawa</i> ”), tomato and smoked dried fish	Energy = 69.52 Protein = 73.23 Fat = 44.98 Vitamin A = 1.24 Iron = 55.29
Wednesday	Banku and Okro	Corn dough, groundnut paste, smoked dried fish, dried red pepper, cassava flour, tomato paste and salt	Energy = 39.92 Protein = 54.11 Fat A = 33.77 Vitamin A = 3.18 Iron = 66.35
Thursday	“Tuubani”	White beans, shea butter, cassava flour, onion, salt, dried powdered pepper, groundnut flour with fat	Energy = 75.56 Protein = 138.95 Fat = 50.75 Vitamin A = 8.41 Iron = 123.33
Friday	Rice and Beans	Rice, white beans, smoked dried fish, onion, salt, vegetable oil and tomato	Energy = 67.09 Protein = 87.99 Fat = 39.47 Vitamin A = 5.08 Iron = 49.77

Quality education is crucial in achieving SDG 4 of the United Nations, which calls for inclusive and equitable quality education and the promotion of lifelong learning opportunities. However, a large number of learners (pre-primary to tertiary) may never return to school due to various reasons. While school feeding programmes have the potential to positively impact the nutritional status and academic performance of pupils, their effectiveness may be limited, as evidenced by the findings of [Agujar et al. \(2020\)](#). Nonetheless, providing appropriate nutrition is essential in preventing and treating malnutrition, as good nutrition contributes to strong immune systems, and physical and cognitive development ([Maslow, 1996](#)), and helps break the cycle of poverty. According to [Glewwe and Jacoby \(1994\)](#), malnourished children in Ghana often start school later and complete fewer years compared to well-nourished children. Thus, school feeding programmes could have a positive impact on school enrollment and attendance.

The school feeding programme's micronutrient content can be enhanced by incorporating produce from school gardens. However, this practice is not widely followed due to limited funding and timely receipt of funds, as confirmed by [Agujar et al. \(2020\)](#).

This study revealed an overall increase in the number of schools participating in the school feeding programme over the past three academic years. However, variations were observed within and between schools. There was no clear relationship established between the school feeding programme and enrollment figures. Nonetheless, the menu offered in schools participating in the GSFP has the potential to improve the nutritional status of pupils, which could lead to improved academic performance as affirmed by the [World Food Programme \(2008\)](#).

#### 4. Conclusion

There was an increase in the number of participating schools from 20 in 2018/2019 to 33 in 2020, with no change in the 2021 academic year. Although there were fluctuations in enrollment numbers between both participating and non-participating schools, significant differences were observed among some schools. While the study did not provide a clear link between the school feeding programme and high enrollment numbers, it highlighted the potential for the programme to improve the nutritional status and academic performance of pupils. The provision of these local meals could contribute to teaching pupils the rich culture of Ghana through food diversity. The procurement of local ingredients for the meals could help increase the income of farmers, aggregators, and processors along the value chain.

However, other factors such as school performance and population growth could have impacted enrollment numbers. The findings from this study can inform future decisions regarding the implementation and improvement of school feeding programmes in Ghana and similar regions. Further research is needed to assess the long-term effects of the GSFP on enrollment and academic performance in Ghanaian primary schools.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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