

RESEARCH ARTICLE

EFFECT OF SCHOOL FEEDING PROGRAMME PRACTICES ON STUDENTS' ACADEMIC PERFORMANCE IN MATHEMATICS SUBJECT IN PUBLIC PRIMARY SCHOOLS IN RWANDA

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Manuscript Info

Abstract

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The purpose of this study is to evaluate how school feeding programs impact academic performance in mathematics among students in public primary schools within Nyanza District. Its objectives were twofold: firstly, to assess the effectiveness of these feeding programs; secondly, to determine the relationship between the feeding program and students' academic achievements. The research employed a descriptive research design, utilizing both questionnaires and interviews to gather data. A sample size of 173 participants was determined using the Yamane formula, consisting of 155 teachers and 18 head teachers selected via simple random sampling and purposeful selection methods. Data collection involved administering teacher surveys and conducting interviews with head teachers. The gathered quantitative data were analyzed using IBM/SPSS, focusing on percentages and correlation coefficients. Key findings indicated mixed perceptions among respondents regarding the adequacy of food and cleanliness of water provided by the feeding programs. Approximately half of the respondents believed their students performed well in national mathematics exams and learned effectively after lunch, while a majority felt that learners were motivated during teaching activities. The study found a moderate positive correlation (coefficient of determination = 0.809) between aspects of the school feeding program and students' academic performance in mathematics. Limitations of the study included potential biases in self-reported data and the narrow geographical focus on Nyanza District, limiting generalizability to other regions. Implications suggest that improving the quality and consistency of school feeding programs could positively influence academic outcomes in mathematics.

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Introduction:-

The statement outlines the challenging educational landscape in Rwanda post-genocide, emphasizing the detrimental impact of hunger on student learning and performance, particularly in mathematics. Citing statistics from MINEDUC, it highlights significant student repetition and dropout rates, attributing these issues to poor attendance and learning conditions exacerbated by food insecurity. Despite efforts to address inequalities in education, such as through comprehensive strategies by the Rwandan government, challenges persist, necessitating focused interventions like the school feeding program. The purpose of the statement is to introduce a proposed research study aimed at evaluating the impact of the school feeding program on students' academic performance in mathematics.

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specifically within Nyanza District. The importance of this research topic lies in addressing a critical gap in existing literature, which lacks specific insights into the localized effects of such programs on academic outcomes. By focusing on mathematics, known to require significant attention and cognitive resources, the study aims to provide empirical evidence on how adequate nutrition can mitigate educational inequalities and improve learning outcomes for vulnerable children.Contribution to the body of knowledge includes potential insights into the effectiveness of school feeding programs in Rwanda, particularly in improving academic performance in mathematics. Such findings could inform policy-makers and educators about the targeted benefits of nutritional interventions in enhancing educational equity and quality, thereby contributing to broader efforts in educational reform and development in Rwanda and beyond.

Background to the study

The nonfiction underscores the transformative potential of school feeding programs on education. Studies from diverse contexts such as the United States, China, Nigeria, and Kenya consistently highlight the positive correlation between school feeding and educational outcomes (Mortan, 2015; Sayduh, 2016; Lenhma, 2018; Kimuha, 2019). For instance, in Nigeria, the Home-Grown School Feeding Strategic Plan aimed to improve attendance and academic success by ensuring regular meals for students (Nyathy, 2017). Similarly, in Kenya, the School Nutrition and Meals Strategy aligns with broader national goals of enhancing enrollment and supporting local economies (Kimuha, 2019).

In Rwanda, despite initial challenges, the government has made significant strides in implementing and expanding the school feeding program. Prime Minister AnastaseMurekezi's commitment in 2016 marked a pivotal moment, ensuring that thousands of needy students across districts received daily meals to support their learning (Prime Minister's Office, 2016). This initiative reflects Rwanda's dedication to leveraging education as a pathway to national development, underscoring the importance of nutritional support in achieving educational equity and excellence.

While existing literature provides valuable insights into the general benefits of school feeding programs, there remains a specific gap regarding their impact on mathematics education in Rwanda, particularly at the primary school level in Nyanza District. Mathematics is not only a fundamental academic subject but also a key determinant of cognitive development and future academic and career success (Katst, 2017). Understanding how school feeding influences mathematics performance is crucial for designing targeted interventions that enhance educational outcomes and ensure inclusive growth. The decision to research this topic stems from the recognition of persistent educational challenges in Rwanda, despite commendable efforts to improve access and quality. Specifically, mathematics emerges as a critical area where students face difficulties, exacerbated by factors like hunger and inadequate nutrition (MINEDUC, 2022). By focusing on Nyanza District, this study aims to provide localized evidence on whether and how the school feeding program contributes to improved mathematics performance. Education plays a crucial role in societal development by imparting knowledge and skills essential for individual and collective progress (Matheson, 2014). In Rwanda, as in many countries, educational success is closely linked to socio-economic factors and access to adequate nutrition. The aftermath of the 1994 genocide devastated Rwanda's education system, requiring substantial efforts to rebuild and improve educational outcomes. Despite ongoing reforms and initiatives, challenges such as high student repetition, dropout rates, and poor academic performance persist, particularly in subjects like mathematics (MINEDUC, 2022). One significant intervention aimed at addressing these challenges is the school feeding program. This program has been shown to enhance educational enrollment, retention, and performance by alleviating hunger and improving attendance (Theogene&Kamuhanda, 2021). However, there remains a gap in understanding how specifically the school feeding program impacts academic performance in mathematics, a subject critical for cognitive development and future opportunities (Gibson, 2016).

Literature Review:-

School feeding programs have emerged as crucial interventions worldwide, aiming to alleviate hunger among students and enhance educational outcomes. In Rwanda, these programs play a pivotal role in addressing nutritional deficiencies and promoting academic success, particularly in primary schools. This review synthesizes existing literature on the effectiveness of school feeding programs, their objectives, factors influencing implementation, and their impact on pupils' academic performance.

The primary objectives of Rwanda's school meal program, according to MINEDUC (2013), are multifaceted. Firstly, they aim to ensure adequate nutrition for preschool and primary school children, particularly in economically disadvantaged areas. Secondly, these programs seek to enhance enrollment, attendance, and graduation rates by reducing barriers to education posed by hunger and malnutrition. Moreover, they strive to mitigate gender-based disparities in access to education, fostering inclusive learning environments across urban, rural, and interregional settings. Community involvement is cited as a critical factor influencing the successful implementation of school feeding programs. Moningka (2016) argues that community participation fosters a sense of ownership and support for such initiatives. This involvement includes disseminating information about program benefits and garnering local support for sustained implementation. Financial support also emerges as crucial, ensuring the program's continuity and scalability to effectively reach vulnerable children across diverse geographical areas.

Research indicates that school feeding programs have a profound impact on pupils' academic performance. Yunusa (2017) highlights that these programs significantly contribute to addressing poverty-related barriers that hinder school enrollment and attendance. Improved attendance, concentration, and cognitive performance are observed among students who benefit from regular meals at school (Simeon, 2018). In Jamaica, a study noted a marked increase in math exam scores following the introduction of school feeding, underscoring its role in enhancing educational outcomes (Yunusa, 2017). Adenkul et al. (2016) corroborate these findings, emphasizing the positive correlation between school feeding programs and student performance across various studies. They argue that adequate nutrition reduces absenteeism, supports cognitive development, and fosters a conducive learning environment, all of which contribute to improved academic achievement. In conclusion, the reviewed literature highlights the transformative impact of school feeding programs enhance enrollment, retention, and academic performance, particularly in subjects like mathematics. Community involvement and financial support are pivotal for the successful implementation and sustainability of such initiatives. Moving forward, continued research and targeted interventions are essential to optimize the benefits of school feeding programs and ensure equitable access to quality education for all children.

Theoretical framework

According to Korobo and Tromp (2016), a theoretical framework serves as a cohesive structure of interconnected concepts derived from multiple theories, aimed at providing explanations for why certain actions and phenomena occur. It helps researchers grasp the underlying complexities of a subject by integrating diverse theoretical perspectives, thus offering a comprehensive understanding of the research challenge at hand. By utilizing such a framework, researchers can effectively conceptualize their topic and explore new avenues of inquiry. Furthermore, the impact of malnutrition on a child's learning ability underscores the practical significance of theoretical frameworks in educational and developmental research. Malnutrition, characterized by deficiencies in essential nutrients crucial for cognitive development, has been linked to impaired memory, reduced concentration, and overall diminished academic performance (UNICEF, 2020). Theoretical frameworks rooted in educational psychology and nutritional sciences provide insights into these detrimental effects, guiding interventions that address nutritional deficiencies and promote optimal learning environments. Therefore, integrating theoretical frameworks not only enhances the theoretical underpinning of research but also informs practical strategies to mitigate educational challenges such as malnutrition, thereby contributing to improved educational outcomes and holistic child development

Maslow's Hierarchy of Needs, originally conceptualized in the mid-20th century, remains highly relevant today, particularly in educational settings where it provides a framework for understanding and enhancing student motivation and academic performance. The hierarchy consists of five levels, beginning with physiological needs such as air, food, and water, which form the foundation. If these basic needs are not met, students may struggle to focus on academic tasks or even attend school regularly. For instance, a student who lacks access to nutritious meals or suffers from sleep deprivation due to unstable living conditions may find it challenging to engage effectively in learning activities. Moving up the hierarchy, the next level comprises safety needs, including physical safety as well as a stable environment. In educational contexts, this translates to ensuring students feel safe both physically (from violence or harm) and emotionally (from bullying or discrimination). When students feel secure in their environment, they are better able to concentrate on their studies and participate actively in classroom activities.

The third level encompasses social needs, such as the desire for belongingness and acceptance. Schools play a crucial role in fostering a sense of community where students can form positive relationships with peers and

teachers. A supportive social environment enhances students' emotional well-being and encourages collaboration and teamwork, which are essential skills for academic success. Further up the hierarchy are esteem needs, which include recognition, achievement, and self-worth. In an educational setting, this translates to providing opportunities for students to receive praise for their efforts, celebrate their achievements, and develop a sense of competence in their abilities. Teachers can contribute significantly by providing constructive feedback, setting achievable goals, and fostering a growth mindset among students.



Figure 1:- Maslow's Hierarchy of Needs Pyramid.

At the pinnacle of Maslow's Hierarchy are self-actualization needs, representing the desire for personal growth, fulfillment of potential, and pursuing individual aspirations. In educational terms, this involves encouraging students to explore their interests, pursue challenging academic goals, and develop critical thinking skills. When students are motivated by a sense of purpose and self-fulfillment, they are more likely to excel academically and contribute positively to their learning community. In practice, educators can leverage Maslow's Hierarchy of Needs by first ensuring that students' basic physiological and safety needs are met through access to nutrition, safe learning environments, and supportive relationships. Building on this foundation, teachers can then foster a positive classroom culture that promotes social connections, acknowledges students' achievements, and encourages personal growth. By addressing these fundamental human needs, educators create conditions that optimize student motivation, engagement, and ultimately, academic performance. Thus, integrating Maslow's framework into educational practices not only enhances student well-being but also lays the groundwork for achieving educational goals and promoting lifelong learning.

Research Methodology:-

The research focuses on evaluating the relationship between school feeding program and students' academic performance in mathematics subjects in public primary schools in Nyanza district, Rwanda. The study utilizes a descriptive survey design to collect and analyze data, employing both qualitative and quantitative approaches. The study adopts a descriptive survey design, which is suitable for preliminary and exploratory studies aimed at clarity in data collection, synthesis, presentation, and interpretation. This design enables the researcher to gather sufficient data from a large number of respondents to understand key factors and opinions related to the in-service teacher development program. Both qualitative and quantitative approaches are employed to quantify data and explore relationships between variables. Qualitative methods involve gathering detailed insights through interviews or open-ended questions, while quantitative methods involve statistical analysis to establish associations between variables. The researcher uses a two-stage sampling process. Head teachers are sampled using purposive sampling, chosen for their expertise and role in overseeing educational programs. Teachers are selected through simple random sampling, ensuring each teacher in the sample has an equal chance of participation. This method aims to representatively capture perspectives from both leadership and teaching staff.

Purposive sampling of head teachers ensures that individuals with relevant expertise and experience are included, providing nuanced insights into program implementation and impact. Simple random sampling of teachers ensures a representative sample, minimizing bias and allowing for generalization of findings. Using both qualitative and quantitative methods allows for a comprehensive understanding of the factors influencing teacher performance. Qualitative methods capture rich, contextual data from participants, while quantitative methods enable statistical analysis to establish correlations and trends. The descriptive survey design is chosen for its suitability in providing a clear and detailed snapshot of the current state of in-service teacher education programs and their impact. This design allows the researcher to systematically collect and analyze data to answer research questions effectively.

Influences of the Research are where the findings aim to inform educational policies and practices by providing insights into the effectiveness of in-service teacher education programs. This can lead to improvements in training strategies and curriculum development tailored to enhance teacher performance. Understanding the perspectives of head teachers can influence decisions related to resource allocation, professional development, and school improvement initiatives, thereby enhancing overall school management. By assessing the impact of in-service education on teacher performance, the research contributes to ongoing efforts to enhance teaching quality and student learning outcomes in technical schools.

Results and Discussion:-

This section presents the study's findings and discusses them in relation to the goals of the investigation. The results were examined in light of other older and more recent study findings in order to draw an accurate conclusion. However, even as we discuss the study's findings, the goals of the investigation were ascertained from the data, which were subsequently applied to the research questions and the determination of whether or not the study's central hypothesis was supported. The research questions guided the development of the study's objectives, which acted as a kind of compass throughout. Questionnaires and in-person interviews were also used to collect data on these objectives. It is essential to include only the highest frequency, percentage, and mean when examining the study's findings.

Statement	Stro	ngly	Di	sagree	Nei	ıtral	Agr	ee	Stror	ngly	
	Disa	gree							Agre	e	
	Freq	%	F	'req %	Fr	eq %	Fre	զ %	Fr	eq 9	%
At school, there is enough	4	2.3	19	10.9 2	21	12.1	93 53	.7	36	20.8	
food for the students.											
Every day, students receive	9	5.2	27	15.6	29	16.7	87 5	0.7	21	12.1	
clean water											
At our school we change the	19	10.9	21	12.1	12	6.8	102	58.9	19	10.9	
food every day											
Frequently, food is cooked	22	12.7	20	11.5	59	5.2	2 91	52.6	5 31	17.9	
well before being offered to pupils											
At our school pupils receive	7	4	9	5.2	31	17.9	108	62.4	18	10.4	
food on time											
Our pupils receive different	29	16.7	38	21.9	6	3.4	93	53.'	77	4	
types of food because											
they are indifferent grades.											
The views of students on the	31	17.9	17	9.8	19	10.9	89	51.4	17	9.8	
food provided are completely f	ree										

Table 1:- The level of effectiveness of school feeding program in public primary schools in Rwanda.

Strongly Disagree (D), Disagree(D), Neutral(N), Agree (A), StronglyAgree (SA)

The provided data from Table 1 highlights various aspects of teachers' perceptions regarding school feeding programs and their impact on students' well-being. According to the table, a significant percentage of teachers agreed that their schools provide adequate food (53.7%), clean water daily (50.7%), and varied food options based on grade levels (53.7%). Additionally, a majority of respondents indicated that food is prepared well before being served (52.6%) and is served punctually (62.4%). Furthermore, a substantial portion agreed that students' feedback on the food served is valued (51.4%). Johyne (2019) underscores that access to a nutritious lunch at school enhances students' enjoyment of school, academic performance, and overall achievement. This aligns with Morgram's (2016) assertion that a conducive learning environment, facilitated by a well-organized school feeding program, positively influences students' cognitive development and mindset. The provision of clean water, as noted by Kylon (2016),

contributes to students' cognitive function, allowing them to concentrate better and sustain focus for extended periods. Klinamy (2018) emphasizes that adequate nutrition, including regular and nutritious meals at school, supports optimal learning conditions. When students are well-nourished and have access to balanced meals, it enhances their ability to learn effectively without hindrance. Moreover, Klinamy notes that proper nutrition supports physical and mental health, enabling students to engage in learning activities for prolonged periods without fatigue.

The findings from Table 1. reveal a positive perception among teachers regarding the implementation of school feeding programs in Nyanza district schools. A majority of teachers acknowledge the availability of sufficient food, clean water, varied food options, and timely meal service. These factors are crucial as they directly impact students' physical health, cognitive development, and academic performance. Access to adequate nutrition has been consistently linked to improved educational outcomes. When students receive nutritious meals regularly, it not only addresses immediate hunger but also supports their overall well-being, including physical growth and cognitive functioning. This is echoed by Morgram (2016), who suggests that a well-fed student is more likely to excel academically due to the conducive environment created by proper nutrition. Furthermore, the provision of clean water is essential for hydration and maintaining optimal cognitive function, as highlighted by Kylon (2016). Hydration supports students' ability to concentrate, participate actively in learning activities, and remain attentive throughout the school day. The findings also underscore the importance of meal variety and quality. Teachers' perceptions that food is prepared well and served punctually contribute to a positive school environment where students feel supported and cared for. This positive environment, in turn, fosters a conducive atmosphere for learning, as noted by Klinamy (2018). In conclusion, the data from Table 1 and the insights from the cited authors collectively emphasize the critical role of school feeding programs in promoting students' well-being and academic success. By ensuring access to nutritious meals, clean water, and well-managed food services, schools in Nyanza district can significantly enhance students' educational experiences and outcomes.

Statement	Strongly Disagree		Disagree	Neutral	Agree	Strongly Agree	
	Freq	%	Freq %	Freq %	Freq %	Freq %	
Students from this school perform well mathematics in final examination	20	11.5	27 15.6	21 12.1	88 50.8	17 9.8	
School feeding program helps our students to attend mathematics subjects class rather than another subject.	3	1.7	27 15.6	31 17.9	91 52.6	21 12.1	
After lunch our students learn mathematics well	15	8.6	13 7.5	19 10.8	8 87 50.2	2 19 10.9	
During teaching and learning activities, all learners are motivated to learn	19	10.	9 14 8	9 5	5.2 101	58.3 31 17.9	

Table 2:- Perception of teachers on students' academic performance in mathematics subjects due to school feeding program.

SD: Strongly Disagree, D: DisagreeN: Neutral, A: Agree, SD: StronglyAgree

In recent years, school feeding programs have emerged as a critical intervention to enhance students' well-being and academic performance in various contexts globally. This study focuses on exploring the perceptions of teachers regarding the impact of school feeding programs on students' academic performance in mathematics subjects within the context of Nyanza District, Rwanda. The findings from the study provide insights into how such programs are perceived by educators and their potential implications.

The findings from the survey conducted among teachers in Nyanza District reveal several interesting insights regarding the perceived impact of school feeding programs on students' academic performance in mathematics. According to Table 2, 50.8% of the respondents agreed that students from their schools perform well in mathematics in national exams. This suggests a general positive perception among teachers regarding the academic achievements of students, which they attribute, at least partially, to the school feeding program. A significant portion

of teachers (52.6%) agreed that the school feeding program helps students attend mathematics classes rather than other subjects. This indicates that teachers perceive the program as influencing students' subject preferences and attendance patterns positively. Teachers also reported on the effectiveness of learning mathematics after lunch, with 50.2% agreeing that students learn well during this period. This finding aligns with the idea that nutritious meals provided by the feeding program contribute to students' cognitive abilities and concentration levels post-lunch.

The majority of teachers (58.3%) agreed that during teaching and learning activities, all learners are motivated to learn. This suggests that teachers observe an improvement in students' motivation and engagement, potentially linked to the nutritional support provided by the school feeding program. The theoretical underpinning of the study draws upon various scholarly perspectives that link nutrition to cognitive function and academic performance. According to Ben (2019), proper nutrition, including essential nutrients like protein, vitamins, and minerals, enhances cognitive functions such as concentration and memory. This supports the argument that school feeding programs indirectly support academic performance by addressing nutrition deficiencies that can impact students' ability to learn effectively. Additionally, Alymn (2018) argues that while school feeding programs may not directly influence students' subject choices, they play a crucial role in supporting attendance and participation across all subjects. This aligns with the findings that teachers perceive the feeding program as contributing to students' attendance and engagement in mathematics classes.Furthermore, Morgan (2015) suggests that lunch breaks provided by school feeding programs offer students a mental refresh, which can improve their readiness to engage with academic subjects like mathematics. This aspect highlights the holistic benefits of such programs beyond mere nutritional support.

Implications and Recommendations is that the positive perceptions of teachers regarding students' academic performance and engagement highlight the effectiveness of the school feeding program in Nyanza District. It underscores the importance of continuing and possibly expanding such initiatives to further enhance educational outcomes. There is a need to ensure that the meals provided through the feeding program meet nutritional standards and are balanced to maximize their impact on students' cognitive abilities and overall health. Providing training for teachers on nutrition education and the benefits of school feeding programs can enhance their understanding and support for these initiatives, leading to more effective implementation and monitoring. Engaging parents and the community in supporting and sustaining school feeding programs can contribute to their long-term success and impact.

<u> </u>		Н	ead	Т	eachers		Total	
		T	eacher					
	Sca	ıle Fr	eq %	Free	q %	Freq	%	Mean
The school feeding	SD	0	0	4	2.5	6	3.8	10.869
program encourages	D	0	0	14	9	9	5.8	
pupils to attend	Ν	1	5.5	8	5.1	11	7	
frequently mathematics	A	9	50	99	63.8	112	72.2	
classes	SA	8	44.4	31	20	17	10.9	
The school feeding	SD	0	0	7	4.5	3	1.9	10.713
program motivates and	D	0	0	6	3.8	7	4.4	
makes students love their	r N	0	0	2	1.2	2	1.2	
learning especially	Α	12	66.6	117	75.4	119	76.7	
mathematics subjects	SA	6	33.3	23	14.8	24	15.4	
Due to school feeding	SD	0	0	6	3.8	3	1.9	10.694
program Students pay	D	0	0	15	9.6	4	2.5	
maximum attention to	Ν	0	0	19	12.2	2 11	7	
teachers during teaching	Α	15	5 83.3	88	56.7	7 114	73.5	
and learning sessions	SA	3	16.6	27	17.4	4 23	14.4	

Table 3:- The relationship between the school feeding program and students' academic performance in mathematics subjects in public primary schools in Rwanda.

SD: Strongly Disagree, D: DisagreeN: Neutral, A: Agree, SD: StronglyAgree

Table 3 presents the findings regarding the relationship between the school feeding program and students' academic performance in mathematics subjects, as perceived by head teachers and teachers in public primary schools of Nyanza district. The table categorizes responses based on different statements related to the impact of the school feeding program on students' behaviors and academic engagement. The majority of respondents (72.2%) agreed (including 44.4% strongly agreed and 27.8% agreed) that the school feeding program encourages pupils to attend mathematics classes frequently. This suggests that providing meals at school has a positive influence on students' attendance and participation in mathematics education.

Similarly, a significant portion of respondents (76.7%) agreed (including 33.3% strongly agreed and 43.4% agreed) that the school feeding program motivates and makes students love their learning, especially in mathematics subjects. This indicates that access to nutritious meals correlates with increased motivation and enjoyment in studying mathematics. Regarding students' attention during teaching and learning sessions, 73.5% of respondents agreed (including 16.6% strongly agreed and 56.7% agreed) that students pay maximum attention to teachers. This suggests that the school feeding program contributes to a conducive learning environment where students are attentive and engaged in classroom activities.

This implies these findings highlight several positive outcomes associated with the school feeding program in Nyanza district primary schools. First, the program appears to significantly enhance students' attendance in mathematics classes, which is crucial for their academic progress. Improved attendance can lead to better understanding of mathematical concepts and increased performance in assessments. Second, the program fosters motivation and a positive attitude towards learning mathematics among students. When students are motivated and enjoy their studies, they are more likely to actively participate in class discussions, complete assignments, and perform well in exams. Lastly, the findings indicate that the school feeding program contributes to creating a conducive learning environment where students are attentive to teachers. This attentiveness can result in better communication between teachers and students, leading to improved learning outcomes. In conclusion, the findings from Table 2 suggest a strong correlation between the school feeding program not only encourages attendance and motivation among students but also enhances their engagement during teaching sessions. These insights underscore the importance of continued support and investment in school feeding programs to promote educational success and well-being among students.

	in mathematics subjects						
School feeding	Pearson Correlation	.809**					
Programme	Sig. (2-tailed)	000					
	N	173					
** Correlation is signification	ant at the level (2-tailed)						

 Table 4:- Correlation Between school feeding program and student academic performance in mathematics subjects.

 Students' academic performance

Source: Primary Data (2024)

The correlation coefficient of 0.809^{**} between the school feeding program and students' academic performance in mathematics subjects, as shown in Table 4, indicates a strong positive relationship between these variables in public primary schools of Nyanza district. This Pearson correlation coefficient was computed using statistical software (SPSS), and it is considered significant at the 0.01 level (2-tailed), meaning there is a very low probability (0.01 or 1%) that this strong correlation occurred by chance. A correlation coefficient (r) of 0.809 suggests a strong positive linear relationship between the school feeding program and students' academic performance in mathematics subjects. This indicates that as the presence or effectiveness of the school feeding program increases, so does students' performance in mathematics. Conversely, when the school feeding program is less effective or absent, there tends to be a decrease in students' academic performance in mathematics subjects that can be explained by the school feeding program. In this case, r2 is calculated as $0.809 \times 0.809 = 0.654$. This means that approximately 65.4% of the variability in students' academic performance in mathematics can be attributed to the school feeding program. The remaining 34.6% of the variability may be influenced by other factors not included in this study.

The strong positive correlation implies that the provision of meals through the school feeding program significantly enhances students' academic performance in mathematics. When students have access to nutritious meals at school, they are better able to concentrate, participate actively in lessons, and retain information, which are essential for learning mathematics effectively. These findings underscore the importance of investing in and maintaining effective school feeding programs as part of educational policy. Ensuring that students are well-nourished can lead to improved educational outcomes, including higher academic achievement in critical subjects like mathematics.

Conclusions:-

The study investigated the relationship between school feeding programs and students' academic performance in mathematics in public primary schools within Nyanza District, Rwanda. The research objectives were to assess the effectiveness of the school feeding program and to establish the relationship between these factors. The assessment of the school feeding program revealed generally positive perceptions among respondents. Over half agreed that there was sufficient food available, clean water was provided daily, and food variety was adequate. Moreover, a significant majority reported that food was prepared on time and cooked well before being served. These findings suggest that the school feeding program in Nyanza District schools is well-implemented according to the perceptions of those surveyed.

In terms of academic performance in mathematics, the study found a substantial positive correlation between participation in the school feeding program and students' academic achievement. Statistical analysis, specifically Pearson's correlation coefficient, indicated a strong correlation (r = 0.809, p < 0.01) between the two variables. This suggests that the provision of food through school feeding programs significantly contributes to better academic outcomes in mathematics among primary school students.

In light of our discussion and conclusions, the Ministry of Education, education planners, and stakeholders are presented with the following recommendations:

To improve students' academic performance through school feeding program, the Ministry of Education should provide nutritious meals that support cognitive function and overall health by collaborating with nutritionists to develop menus rich in essential nutrients like vitamins, minerals, and protein, and also sourcing fresh, locally produced ingredients to ensure quality and minimize costs. This ministry should also integrate with education by integrating nutrition education components into the curriculum to educate students about the importance of health eating habits and how they related to academic success.

Education planners should sustain planning by developing long-term sustainability plans for the school feeding program, including securing adequate funding, building community partnerships, and establishing clear guidelines for program implementation and monitoring. Education planners should also engage the community by engaging the parents, caregivers, and local stakeholders in the planning and implementation of the school feeding program, soliciting their input and support to ensure its success and sustainability.

The stakeholders should ensure the school provide a balance diet, including essential nutrients like proteins, carbohydrates, vitamins, and minerals, to support cognitive function and overall health. They should also conduct periodic assessments to measure the program's effectiveness in improving academic performance. Analyze data on attendance, grades, and standardized test scores to identify any correlations with the school feeding program.

Implications for Further Research Further studies on the school feeding program and its impact on student's academic performance could explore the following areas:

Firstly, those who are related to education should conduct longitudinal studies to assess the long-term effects of participation in school feeding programs on academic achievement. Tracking studentsover several years to understand how sustained access to nutritious meals influences learning outcomes.

Second, researchers should focus on make qualitative research by using qualitative research methods such as interviews, focus groups, and case studies to explore the mechanisms through which school feeding programs impact student academic performance. Gain insights into students' experience, perceptions, and behavioral changes related to nutrition and learning.

Finally, the researchers should make comparative analysis by comparing the academic performance of students who participate in school feeding programs with those who do not. Analyze data from different schools or regions to identify variations in outcomes based on program implementation and demographics.

By addressing these research areas, scholars can deepen our understanding of the complex relationship between school feeding programs and student's academic performance, ultimately informing evidence-based policy and practice in education and nutrition.

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