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Influence of Food Inventory Management Practices on Operational Costs in Public Secondary Schools in Njoro Sub-County, Kenya

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Abstract: *This study investigated the influence of food inventory management practices on operational costs in public secondary schools in Njoro Sub-County, Kenya. Specifically, it examined inventory monitoring, food storage, delivery verification, pest control, and food rationing practices in relation to operational costs. The study adopted a descriptive survey research design. The target population comprised 235 respondents from 47 public secondary schools, from whom a sample of 70 respondents was selected using a two-stage sampling procedure. Data were collected using structured questionnaires and interview schedules. Quantitative data were analysed using descriptive statistics and Pearson's Product-Moment Correlation Coefficient, while qualitative data were analysed thematically. Findings indicated that food inventory management practices were generally established, with an overall mean of 3.12 (SD = 0.79). Food storage availability, delivery verification, and physical stocktaking were relatively well implemented. However, weaknesses emerged in refrigeration, pest control, timely record updating, and prevention of food losses. Correlation analysis revealed a strong negative and statistically significant relationship between food inventory management practices and operational costs ($r = -0.71$, $p < 0.001$). Qualitative findings highlighted the importance of regular stock reconciliation, proper storage, portion control, and the prevention of food wastage. The study concludes that effective food inventory management is associated with lower operational costs. It recommends strengthening inventory monitoring, improving storage infrastructure, and enhancing procurement planning and expenditure accountability in public secondary schools.*

Keywords: *Food inventory management, Operational costs, Public secondary schools, Stock control, Food wastage*

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1. Introduction

Effective food inventory management is essential for controlling operational costs and ensuring the efficient use of financial resources in public secondary schools. Schools must maintain adequate food stocks to meet students' daily feeding requirements while avoiding excessive purchases, unnecessary storage expenses, spoilage, and wastage. Practices such as accurate stocktaking, proper record keeping, demand forecasting, and the first-in, first-out (FIFO) method can help schools monitor food supplies, reduce losses, and ensure that available resources are used efficiently. The effectiveness of these practices is

particularly important in boarding schools, where food is purchased regularly and must be managed carefully to sustain feeding programmes within allocated budgets.

Globally, inventory management practices influence institutional expenditure through purchasing decisions, stock control, storage, and the prevention of losses. Anajali and Harshal (2018) established that the inventory control systems adopted by secondary schools are important in determining the effectiveness of inventory management. Similarly, Kittisak (2023) identified overstocking, understocking, and errors in documentation and record keeping as challenges that can undermine inventory control. In food inventory management, these challenges may lead to unnecessary expenditure, including costs associated with excess purchases, food spoilage, emergency procurement, and inefficient storage. Furthermore, Chandra (2018) highlighted the importance of procurement methods, including supplier selection, order quantities, and contract negotiations, in determining purchasing expenditure. These findings suggest that effective food inventory management practices can contribute to cost control by improving purchasing decisions and reducing avoidable losses.

In Kenya, inventory management is an important consideration in the financial administration of public secondary schools because food expenditure constitutes a recurring operational requirement, particularly in institutions that provide meals to learners. Njenga (2019) observed that efficient inventory management helps institutions reduce costs by maintaining appropriate stock levels, minimizing waste, and avoiding unnecessary expenditure. Conversely, Achieng, Paul, and Mbura (2018) found that poor inventory management can increase operational costs through overstocking, storage expenses, theft, obsolescence, and emergency purchases arising from understocking. Applied to food inventory, these challenges may result in spoilage, shortages, additional procurement expenses, and inefficient use of school funds. Consequently, practices involving food demand estimation, procurement planning, stock monitoring, storage management, and accurate record keeping are relevant to understanding variations in operational costs among public secondary schools.

In Njoro Sub-County, Kenya, the reported operational expenditure of sampled public secondary schools increased between 2019 and 2023, according to data attributed to the Njoro Sub-County Education Office (2023). For example, the reported average operational cost for School A increased from KSh 35,303.68 in 2019 to KSh 41,341.91 in 2023, while that of School E rose from KSh 47,731.06 to KSh 56,639.24 over the same period. Although these figures indicate increasing expenditure, they do not independently establish that poor food inventory management caused the increase, since other factors, including inflation and fluctuations in commodity prices, may also contribute. Moreover, the extent to which specific food inventory management practices are associated with operational costs in public secondary schools in Njoro Sub-County remains insufficiently established in the background literature provided. The study therefore seeks to investigate the relationship between food inventory management practices and related operational costs in public secondary schools in Njoro Sub-County, Kenya, with a view to generating evidence that can inform more efficient food procurement, storage, stock control, and expenditure management.

2. Literature Review

2.1 Food Inventory Management

Food Inventory Management Practices at Educational Institutions has been researched on by several scholars who have shown how important it is to have effective practices in place to guarantee that students have access to wholesome meals while keeping expenses under control. Mathur and Mathur (2023) in a quantitative study in India with a target population of (13-19) year's teenagers found that food lost while in transit is a serious threat to food security, economy and the environment. Poor storage and improper handling of food results to great loses. Educating stakeholders on food management in the food chain reduces food waste. Several food inventory management practices such as distribution, storage, procurement, and waste minimization tactics contribute largely towards cost and waste minimization. In school kitchens, these practices are essential for fulfilling nutritional needs, reducing food spoilage, and making the most use of available resources. The target population of the study by Mathur and Mathur (2023) were the learners of age bracket (13-19) years, therefore its findings cannot be generalized to secondary schools since the learners are less involved in food management.

Food inventory management practices in educational institutions are greatly influenced by policy frameworks and guidelines. Zahir et al. (2018) in their research in Qatar using qualitative research design from large scale consumers found that food waste changes as policies change. The effects of governmental laws, dietary requirements, and food safety protocols on inventory management affects food waste. To guarantee compliance and quality requirements, researchers have evaluated how well the current regulatory frameworks support successful food inventory management and have pinpointed areas that need improvement with an aim of reducing waste which breeds increment in related operational expenses. Despite the fact that schools are large consumers, the findings of

the study by Zahir et al. (2018) may not be generalized to the local context.

In Poland, a literature review was done by Staniszewski, (2020) where he reviewed 107 articles. The major findings in his review were dealing with food waste globally and recommended an integrated global solution to curb the problem of food waste. In his review, most studies proposed mitigating the negative consequences of food waste rather than dealing with the cause of the waste. He argued that food waste is rampant in the supply chain hence proper technologies should be implemented in the initial stages.

In Brazil, Santiago et al. (2017) did a quantitative study with 365 respondents interviewed on food handling techniques. The results showed that 88% of the food handlers practiced personal hygiene. However, it was noted that there was no use of disposable gloves when handling or distributing food. Also, 75% of the respondents were not aware of the legislation adopted in food handling institutions. The study indicated that most chefs and managers were not well equipped with the knowledge and skills on food handling. Outbreaks of foodborne disease result from several factors like inappropriate use of temperature during food preparation and conservation, cross contamination and poor personal hygiene when handling food. Food inventory management is therefore crucial in an institution in order to prevent such risks that may cause a huge impact on related operational cost of the institution. The study was conducted in hotels and restaurants therefore its findings cannot be generalized to education institutions.

The World Health Organization (2022) reported that access to enough safe and nutritious food is key to sustaining life and promoting good health. Unsafe food containing harmful bacteria, viruses, and parasites causes more than 200 diseases, ranging from diarrhoea to cancers. It also creates a vicious cycle of disease and malnutrition. Education institutions should ensure that there is sufficient amount of food to sustain learners in school. Good collaboration between governments, producers and consumers is needed to help ensure food safety and stronger food systems by ensuring good inventory management practices are put in place.

SDG 12.3 aims to promote sustainable consumption by reducing food loss and food waste by 50 percent (United Nations General Assembly, 2015). Sustainable consumption is a challenge to traditional consumer habits hence new methods of curbing the problem are required. When food is wasted all the energy, water, and natural resources used to produce, transport, and cook that food is wasted too. The food waste can be reduced if not, eliminated through employment of management practices that promote transparency during transportation, storage and distribution to the consumers.

Totobesola et al. (2022) in South Africa, using both qualitative and quantitative methods argued that there is need for a paradigm shift of current research and development programs aimed at food loss reduction to the development of a comprehensive approach for mainstreaming food loss reduction strategies and solutions into national strategic frameworks. They recommended integrating gender considerations and particularly the inclusion of women in harvest and post-harvest operations and in decision-making. The findings of this study indicated a reduction in food losses when proper storage facilities are used but cannot be generalized to secondary schools in Njoro Sub-County since it was targeting farmers in selected African countries. In addition, the sampling technique was not included in the study.

Natural Resources Defence Council reported that 8% of all wasted food comes from institutional and foodservice settings (South Dakota State University Extension, 2021). These settings would include places like hospitals and schools. These statistics show that food waste is a major problem and steps need to be taken to reduce the amount of food waste produced on a daily basis. It is therefore mandatory for education institutions to ensure there is minimal waste in their serving points.

According to the United Nations Environment Programme (2021), food waste burdens waste management systems, exacerbates food insecurity, making it a major contributor to the three planetary crises of climate change, nature and biodiversity loss, and pollution and waste. This is why Sustainable Development Goal 12.3 aims to halve food waste and reduce food loss by 2030.

Mmereki, Emery and Wreh (2024) in a systematic literature review and analysed food losses and waste management in low- and middle-income countries and identified potential strategies to improve food losses and waste management efficiency on the African continent. They argued that factors militating against food losses and waste management include lack of infrastructure, waste reduction and mandatory waste management plans, financial support for food redistribution programmes, awareness and a lack of knowledge of food waste management and effective approaches. They recommended policy reforms from production to consumption levels, proper infrastructure to be put in place and extensive public participation in development of food losses and waste management projects.

In Nigeria, Sonko and Akinlabi (2020) did research in food and beverage manufacturing companies with a target population of 2027 managers. Their findings indicated that

use of ICT had a significant influence on inventory management. However, their research found that inventory forecasting has no significant influence and recommended that adequate implementation of inventory management mechanism needed. Results imply that efficient inventory management techniques, like portion control, menu planning, and inventory control systems, can save costs by minimizing food waste, reducing the amount of excess, and expediting the purchasing practices. To ensure minimal waste of food, education institutions should abide by the learner food ratio by ensuring that learners eat just enough. Despite the findings of this study indicating a significant effect of inventory management on operational cost, its findings cannot be generalized to secondary schools since the research was done in food and beverage manufacturing companies.

Magbojuri, Oludolapo and Temitope (2022) in their survey in Nigeria found a significant correlation between inventory management practices and profit performance in a sample of medium-scale food companies. LIFO/FIFO, safety stock inventory techniques and best inventory management practices have highest overall utility. This implied that an effective inventory management practise has a significant impact on related operational cost of any institution. This study too focused on food inventory management in processing industries hence cannot be generalized to secondary schools in Kenya. There is therefore, a need for a study focusing on public secondary schools in Njoro Sub-County Kenya.

Food safety is central to public health, food security, and improved livelihoods through trade facilitation and sustainable development. Access to safe food is a fundamental right as prescribed in Article 43 as read with Article 46 of the Constitution of Kenya (Parliament of Kenya, 2010). Food safety needs to be ensured by protecting the food from all types of hazards that may occur during all stages of food production, including primary production, harvesting, processing, transporting, retailing, distributing, preparing, storing and consumption. The policy envisages an effective and efficient food safety system that aimed at securing access to safe and quality food for all, thus reducing morbidity and mortality rates arising from foodborne diseases and facilitating trade. It is expected that all players in the food safety continuum will provide the necessary infrastructure for the successful implementation of the National Food Safety Policy. The policy will be implemented through the national food control strategy; strengthening of food safety infrastructure and institutional frameworks; compliance to food safety requirements.

In Kenya, Wathome (2017) found that common issues in food management include varying food demand, a shortage of storage facilities, high equipment maintenance cost, incompetent staff, and poor food handling. The storage facilities are prone to rodents and pests that cause damage on the stock hence causes subsequent losses. Mtamira, Shanyisa and Ombugu (2021) pointed that storage facilities in most institutions in Kenya are in poor conditions hence attracts rodents, weevil and pests which attack food in stores causing significant loses. Spillage is another cause of food waste. Hence recommended that proper management needs to be put in place to curb the loss. The studies by Wathome (2017) and Mtamira, Shanyisa and Ombugu (2021) focused on the farmers in Tranzoia, hence cannot be generalized to schools, hence there is need of a study targeting public secondary schools.

Ouma (2021) in a study in Kenya using both qualitative and quantitative research design in public primary schools in Gilgil Sub-County found that food inventory management practices may affect students' academic performance and nutritional results in school setting. The findings of the study by Ouma (2021) cannot be generalized to secondary schools in Njoro Sub-County since it was done in primary schools This review provides background information for the current study, which intends to provide fresh insights into the sector and educate policy and practices by examining the relationship between food inventory management strategies and related operational expenses in secondary schools in Njoro Sub-County, Kenya.

In summary, the factors affecting food inventory management from the previous studies include lack of proper storage facilities, improper handling of food when in transit and in stores, lack of technology in record keeping, poor personal hygiene by chefs and managers which leads to spoilage, spillage in serving points, lack of waste management plan, incompetent staff in handling food and lack of inclusion of all stakeholders in food management.

3. Methodology

The study adopted a descriptive survey research design to investigate the relationship between food inventory management practices and related operational costs in public secondary schools in Njoro Sub-County, Kenya. The design was appropriate because it enabled the researcher to collect quantitative and qualitative data on existing food procurement, stock control, storage, record keeping, and food wastage management practices without manipulating the study variables. The target population comprised 235 respondents, including principals, bursars, and storekeepers, as well as laboratory technicians and librarians, drawn from 47 public secondary schools in the sub-county. A sample of 70 respondents was selected using a two-stage sampling procedure involving simple random sampling of schools and purposive selection of

respondents. However, because the study focuses specifically on food inventory management, the participation of laboratory technicians and librarians should be retained only where their roles directly relate to food inventory; otherwise, the respondent categories should be revised to include personnel directly responsible for food procurement, stores, catering, and financial management. Data were collected using structured questionnaires and interview schedules, which gathered information on food inventory management practices and related operational costs. A pilot study involving 20 participants from schools excluded from the main study was conducted to assess the clarity and suitability of the research instruments, while expert review was used to establish content validity and test–retest procedures were used to assess reliability.

Quantitative data were coded and analysed using the Statistical Package for the Social Sciences (SPSS), while qualitative data from interviews were analysed thematically and presented in narrative form. Descriptive statistics, including means and standard deviations, were used to summarise food inventory management practices and related operational costs, while the Pearson Product-Moment Correlation Coefficient was used to establish the direction and strength of the relationship between the two variables. The analysis focused on food procurement planning, demand forecasting, stock monitoring, storage practices, record keeping, and the management of food spoilage and wastage in relation to costs such as food purchasing, storage, losses, and emergency procurement. The statistical significance of the relationship was assessed to determine whether the observed association was statistically significant. Qualitative findings were used to explain and complement the quantitative results, providing further insight into how food inventory management practices may be associated with variations in operational costs among public secondary schools in Njoro Sub-County. The researcher obtained the relevant institutional and research approvals, informed participants about the study, sought their voluntary consent, and maintained confidentiality throughout data collection and analysis.

4. Results and Discussion

To establish the relationship between food inventory management practices and related operational costs in public secondary schools in Njoro Sub-County, Kenya.

Table 1: Descriptive analysis for food inventory management practices

Statement	N	Mean	Std Deviation
Physical inventory counting is done to reconcile with the records in our school.	14	3.37	0.83
Physical inventory checking is conducted in our school to ascertain their condition.	14	3.29	0.81
There is a food storage facility in our school	14	3.52	0.74
The food storage facility in our school is in a good condition	14	3.14	0.86
There are no rodents in our food storage facility	14	2.48	0.93
There are no weevils in our food storage facility	14	2.53	0.91
The quantity of food received is checked to confirm if it tallies with what is recorded as received	14	3.41	0.78
There is a refrigerator for storage of perishable food in our school	14	2.18	0.97
The food in stores is safe from theft	14	3.06	0.84
Food ratio is done in our school	14	3.23	0.82
Overall	14	3.12	0.79

The findings indicate that physical inventory counting, physical inventory checking, presence of food storage facility, condition of storage facility, verification of quantity of items, safety of food stores and food rationing were relatively well established, with their means relatively above 3. Rodents and weevil invasion and presence of refrigerators scored low mean indicating weakness in management.

Table 2: Distribution of Responses on Food Inventory Management Procedures

Procedure	Strongly Disagree n (%)	Disagree n (%)	Agree n (%)	Strongly Agree n (%)	Total n (%)
Physical inventory counting is done to reconcile with the records in our school.	1 (7.1)	1 (7.1)	5 (35.7)	7 (50.0)	14 (100.0)
Physical inventory checking is conducted in our school to ascertain their condition.	0 (0.0)	2 (14.3)	5 (35.7)	7 (50.0)	14 (100.0)
There is a food storage facility in our school.	0 (0.0)	1 (7.1)	4 (28.6)	9 (64.3)	14 (100.0)
The food storage facility in our school is in good condition.	1 (7.1)	2 (14.3)	5 (35.7)	6 (42.9)	14 (100.0)
There are no rodents in our food storage facility.	3 (21.4)	5 (35.7)	4 (28.6)	2 (14.3)	14 (100.0)
There are no weevils in our food storage facility.	2 (14.3)	5 (35.7)	5 (35.7)	2 (14.3)	14 (100.0)
The quantity of food received is checked to confirm if it tallies with what is recorded as received.	1 (7.1)	1 (7.1)	4 (28.6)	8 (57.1)	14 (100.0)
There is a refrigerator for storage of perishable food in our school.	4 (28.6)	5 (35.7)	3 (21.4)	2 (14.3)	14 (100.0)
The food in stores is safe from theft.	1 (7.1)	3 (21.4)	5 (35.7)	5 (35.7)	14 (100.0)
Food rationing is done in our school.	1 (7.1)	2 (14.3)	5 (35.7)	6 (42.9)	14 (100.0)

The findings indicate that physical inventory counting was relatively well established, with a mean of 3.37 (SD=0.83) with 85.8% of the respondents agreeing. This suggests that stock reconciliation was generally recognized as an important inventory control procedure. However, the interview findings provide a more nuanced picture, with one participant P1 reporting that *"food stock is counted occasionally, our records are kept though not always updated on time."* This implies that although stock counting and record keeping existed, their implementation was not necessarily regular or timely. The gap between the quantitative perception and qualitative account may indicate that the procedure was present but not consistently institutionalized.

Physical inventory checking to ascertain the condition of food items also received a relatively high mean of 3.29 (SD = 0.81), with 85.7% of respondents agreeing or strongly agreeing. Nevertheless, the interview evidence indicated that *"we inspect our store only when a problem arises."* This finding suggests that inventory inspection may be predominantly reactive rather than preventive. While respondents generally acknowledged the practice, inspections may not occur at sufficiently regular intervals to identify deterioration, pest infestation, or other storage problems before they become significant.

The availability of food storage facilities recorded the highest mean of 3.52 (SD = 0.74), with 92.9% of respondents agreeing or strongly agreeing. However, the qualitative evidence provides an important qualification.

One interviewee stated, *"We do not have a storage facility, we store both perishable and non-perishable food in a small room next to our kitchen."* This suggests that what respondents regarded as a storage facility may, in some schools, constitute merely an available storage space rather than a purpose-built and adequately equipped food store. Therefore, the quantitative finding demonstrates the presence of storage space, while the qualitative evidence raises concerns regarding its adequacy and suitability.

The condition of food storage facilities recorded a mean of 3.14 (SD = 0.86), with 78.6% agreeing or strongly agreeing that the facilities were in good condition. Although this represents a generally positive assessment, the interview evidence concerning the use of a small room adjacent to the kitchen suggests that the quality and functionality of storage arrangements may vary between schools. One interviewee responded that "*The storage facility needed major renovation.*" This may have implications for food preservation, organization, and protection against contamination and spoilage.

The findings concerning rodents produced a relatively low mean of 2.48 (SD = 0.93), while the corresponding finding on weevils recorded a mean of 2.53 (SD = 0.91). Only 42.9% of respondents agreed or strongly agreed that their food stores were free from rodents, while 50.0% agreed or strongly agreed that there were no weevils. These findings suggest that pest infestation remains a challenge in food inventory management. Although the recent interviews did not directly address rodents and weevils, the reported practice of inspecting stores only when problems arise may limit early detection and preventive control of such risks.

The quantity of food received and verified against recorded supplies had a relatively high mean of 3.41 (SD = 0.78), with 85.7% of respondents agreeing or strongly agreeing. This indicates that delivery verification was generally practiced. However, the interview finding that *"we trust our local suppliers on deliveries"* suggests that verification may sometimes be influenced by established relationships and trust. Although trust can facilitate procurement processes, reliance on supplier credibility should not replace systematic physical verification of quantities received against orders and delivery documentation.

The availability of refrigerators recorded a low mean of 2.18 (SD = 0.97), with only 35.7% of respondents agreeing or strongly agreeing. This was the weakest-rated inventory management practice. The finding is particularly significant in light of the interview evidence that some schools store perishable and non-perishable foods together in a small room. The absence of adequate refrigeration potentially exposes perishable foods to spoilage and may consequently increase food wastage and operational costs.

Regarding food security, the mean was 3.06 (SD = 0.84), with 71.4% of respondents agreeing or strongly agreeing that food stored in schools was safe from theft. Nevertheless, the interview finding that *"food theft is reported occasionally"* demonstrates that theft had not been completely eliminated. Thus, although the quantitative results suggest a generally positive level of food security, the qualitative findings indicate that occasional losses through theft remain an operational concern.

Food rationing recorded a mean of 3.23 (SD = 0.82), with 78.6% of respondents agreeing or strongly agreeing that rationing was practiced. However, the interview finding that *"rations depend on available food"* suggests that rationing may not always be based on standardized quantities but may instead be adjusted according to prevailing stock levels. This could affect consistency in food provision and make it more difficult for schools to accurately forecast food requirements.

The interviews further revealed that *"spillages sometimes occur during transport and at serving points due to inadequate containers."* This finding extends the quantitative results by demonstrating that food losses occur not only during storage but also during transportation and serving. Inadequate containers therefore represent a potential source of avoidable wastage and additional operational expenditure.

Overall, the findings demonstrate that food inventory management practices were generally established but inconsistently implemented. The retained mean scores indicate relatively strong practices in food storage availability (M = 3.52, SD = 0.74), delivery verification (M = 3.41, SD = 0.78), stock reconciliation (M = 3.37, SD = 0.83), and physical inspection (M = 3.29, SD = 0.81). Conversely, the relatively low means for absence of rodents (M = 2.48, SD = 0.93), absence of weevils (M = 2.53, SD = 0.91), and availability of refrigerators (M = 2.18, SD = 0.97) point to significant weaknesses in food preservation and storage. The interview findings reinforce these weaknesses by highlighting irregular stocktaking, delayed record updating, reactive inspections, reliance on supplier trust, inadequate storage space, occasional theft, rationing based on available stocks, and spillage resulting from inadequate containers. These findings suggest that improving the regularity of inventory monitoring, adequacy of storage and refrigeration infrastructure, physical verification procedures, security controls, and food-handling equipment would be important for minimizing wastage and controlling operational costs.

Table 3: Correlation Analysis for Food inventory vs Operational costs

Variables	N	r	p-value	Decision
Food inventory vs Operational costs	14	-0.71	0.000	Reject H01

Table 3 presents the correlation results between food inventory management practices and operational costs in public secondary schools. The findings indicate a strong negative and statistically significant relationship between food inventory management and operational costs ($r = -0.71$, $p = 0.000$). Since the p-value is less than 0.05, the null hypothesis (H01) is rejected, implying that improved food inventory management practices significantly reduce operational costs in secondary schools.

This result suggests that schools with effective food inventory systems—such as accurate stock recording, proper storage practices, controlled distribution, and effective monitoring of food usage—experience lower operational costs due to reduced wastage, minimized theft, and efficient resource utilization. Conversely, weak food inventory systems contribute to higher operational costs through food spoilage, overstocking, and inefficiencies in distribution.

These quantitative findings are strongly supported by principals' interview responses, which consistently emphasized structured food management practices across schools. For instance, *P3 stated that "monthly reconciliation of food stocks is done against physical counts and records." while, P6 explained that "quarterly stock reconciliation is carried out and pest control measures are applied in storage areas," and P10 emphasized that "yearly stock checks are conducted and quantities are verified upon delivery."*

Storage and preservation practices were also widely reported as key cost-control mechanisms. P7 indicated that *"Rodent traps used, high storage racks, periodic roof inspection.*" while P3 noted that *"cold storage units are used for perishables and access is restricted through logbooks."* Similarly, P8 explained that *"FIFO method is used in storage and portion control charts guide meal preparation,"* and P11 emphasized that *"standardized portion control and spill prevention training reduce wastage."*

Control of theft, wastage, and portion management also emerged as important themes. P4 observed that *"Storage facility accessed and supervised by kitchen staff"* while P7 stated that *"standardized meal portions are enforced to ensure efficient use of food supplies."* And P8 stated that *"Spill trays and staff training for safe handling.*" These practices demonstrate deliberate efforts to minimize wastage and control consumption patterns within schools.

The findings are consistent with Mathur and Mathur (2023), who found that poor storage and handling significantly increase food losses, thereby raising institutional costs. Similarly, Zahir et al. (2018) emphasize that policy-driven food management systems reduce waste and improve efficiency in large institutions. The results also align with Lean Manufacturing Theory, which emphasizes elimination of waste, continuous improvement, and Just-In-Time inventory control (Ohno, 1956). In school settings, this translates to reduced overstocking, minimized spoilage, and efficient distribution of food resources.

5. Conclusion and Recommendation

5.1 Conclusion

The study concludes that food inventory management practices are important in controlling operational costs in public secondary schools in Njoro Sub-County, Kenya. The findings revealed that the overall level of food inventory management practices was relatively positive ($M = 3.12$, $SD = 0.79$), particularly in the availability of food storage facilities, verification of food deliveries, physical stocktaking, and checking the condition of food items. However, weaknesses were identified in pest control, refrigeration of perishable foods, timely updating of stock records, and the prevention of food losses during transportation and serving. The qualitative findings further indicated that some schools experienced inadequate storage facilities, occasional theft, irregular inspections, and spillage arising from inadequate handling equipment. These weaknesses suggest that the existence of inventory management procedures does not necessarily guarantee their consistent and effective implementation.

The study further concludes that there was a strong negative and statistically significant relationship between food inventory management practices and operational costs ($r = -0.71$, $p < 0.001$). This implies that better food inventory management practices were associated with lower operational costs among the schools studied. Effective stock reconciliation, proper storage, verification of deliveries, pest control, the first-in, first-out (FIFO) method, and portion control can help minimize food spoilage, theft, wastage, and unnecessary purchases. Nevertheless, because the findings are based on a

correlation analysis involving 14 observations, the relationship should be interpreted as an association rather than definitive evidence of causation. Overall, strengthening food inventory management systems is a practical approach that public secondary schools in Njoro Sub-County can consider to improve the utilization of financial resources and manage food-related expenditure more efficiently.

5.2 Recommendations

1. **Strengthen food inventory monitoring and record keeping**. Principals, bursars, and storekeepers should ensure that schools conduct regular physical stocktaking and reconcile actual food stocks with inventory records. All food deliveries should be verified against purchase orders and delivery notes, while stock records should be updated promptly. Schools should also apply the FIFO method to ensure that food items received earlier are used first, thereby reducing spoilage and avoidable losses.

2. **Improve food storage, preservation, and wastage control.** School management should prioritize adequate and secure food storage facilities, appropriate refrigeration for perishable food items, and regular pest-control measures. Schools should also provide suitable containers for transporting and serving food, establish standardized portion-control procedures, and train kitchen and store personnel in proper food handling. These measures would help minimize food spoilage, spillage, theft, and wastage, which may contribute to increased operational costs.

3. **Enhance food procurement planning and expenditure monitoring**. Public secondary school management should base food purchases on enrolment, anticipated consumption, available stock levels, and prevailing market prices. Regular reviews of food expenditure should be undertaken to identify unusual costs, excessive purchases, and avoidable losses. School boards of management should periodically review inventory records and food-related expenditure reports to strengthen accountability and support evidence-based decisions on procurement, storage, and resource allocation.

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