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Operational Management of School Nutrition Programs Promoting Child Health Toward Community Sustainability Outcome

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Abstract: Nutrition program management within schools is important for ensuring that both child health and sustainability results are achieved. The programs that are meant to provide nutritious food are important because it will improve the health status of children while contributing to overall sustainability issues. This study focuses on evaluating the efficiency and operation problems associated with such nutrition programs with regard to sustainability. A mixed-methods research design was used, incorporating a quantitative component (a structured survey), qualitative data from interviews and focus groups, and observations. This sample comprised 80 people, including students, parents, teachers, school administrators, and local health officials. It was found that the school nutrition program had a significant impact on child health, including nutritional status (75% improvement), BMI (60% improvement), academic performance (70% improvement), and physical well-being (72.5% improvement). Furthermore, this community was very involved and this was correlated with the success of the program, proving the impact of stakeholder involvement. Regression analysis also showed that operational factors (e.g., resource allocation, integration with local health policies and stakeholder engagement) significantly impact successful programs, with stakeholder engagement the most influential (0.40). The ANOVA was used to find the relationship between community engagement and better health, and it confirmed the need for engagement in the community. The qualitative findings included operational constraints, including a lack of resources, logistical limitations and the need for greater staff training, resource allocation and community communication. The operational management structure that is well-integrated to accommodate the health, education and sustainability goals is emphasized in this research. In this context, the school nutrition programs could be more effective, larger and longer-lasting in the long run, benefiting not only the health of the children but also the health of the community as a whole.

Keywords: Nutrition, Child Health, Community Engagement, Operational Management, Food Security, Education Policy, Stakeholder Engagement

Introduction

School nutrition programs need to be implemented to improve the child health and community sustainability outcome. The programs that are geared towards providing nutritious food to children have been discovered to not only promote physical health but also the overall environmental, social and economic sustainability agendas. The school feeding programs are sustainable; their frameworks include aspects such as managing the supply chain, involving stakeholders and integrating environmental considerations. To create a supply chain model, which identifies major factors of creating sustainable nutrition programs. They are researching effective supply chain management as

an important component for ensuring a consistent supply of nutritious meals, and working with local farmers, suppliers and schools to minimize and end food waste, as well as increase the sustainability and viability of the programs. Such a process aims at making sure these nutrition programmes will be successful and sustainable to benefit children's health and the health of the society [1]. To explore how these nutrition programmes can be sustainable in the longer term, and to try out which solutions are effective in certain settings and why. They report that flexibility and individuality is key in working with these programs. School lunch policies are proposed to be flexible enough to meet local needs such as culturally relevant food and food production and distribution impacts. Sustainable programs not only boost the health of children but they also help to create community resiliency by incorporating local food systems and promoting environmentally responsible practices. [2] The environmental sustainability of school nutrition programs also looks at how they can be incorporated to be healthy and environmentally sustainable in Vancouver schools. Their research points to the role school nutrition programs can play in reducing environmental footprints of food, such as waste and emissions of carbon. These programs can reduce environmental impact by supporting sustainable food systems and encouraging children to consume locally grown, seasonal food, resulting in improved health and educational outcomes as well [3]. To explore the ways in which the conservation and sustainability of the environment could be integrated into the education programmes, including on coal mining. The study suggests that cross-disciplinary learning, including learning about sustainability, is critical to creating long-term solutions to environmental and societal problems, such as school nutrition. This interdisciplinary approaches can be helpful in school nutrition programs, can be incorporated into the wider sustainability education initiatives, and can promote environmentally responsible behaviors [4].

To make the programs more relevant to the service delivery, the role of the community to improve child and maternal nutrition was emphasized. They also stress the need for partnerships with community members (parental involvement, health authorities, teachers, etc.) to increase the success of school nutrition initiatives. Engaging the community in the development of nutrition programs helps make them culturally relevant and responsive to the needs of the target community, which helps improve health outcomes and increase participation [5]. There is ample evidence of the impact of school feeding on children's health and education. In third world countries the school feeding programmes are used to emphasise their positive effects on the health and educational development of children. This indicates not only that well-nourished children are healthy, but that they are also well schooled and therefore perform better academically. This double benefit further serves to emphasize the need to include school nutrition programs in a larger health and education policy. With the growing significance of sustainability as a factor, there is a need to incorporate Environmental, Social, and Governance (ESG) concepts into the operation strategy. To talk about how ESG principles may be integrated into corporate financial strategies to help people stay healthy and grow sustainably. School nutrition programs can be implemented using this framework because sustainable sourcing, waste management, and community participation are the main ESG aspects that can ensure their overall success [7].

To investigate implementation, impact and challenges of school health and nutrition programs and offer some insights into the perceptions of the stakeholders in Nepal. In this note that even with the difficulties that may come with limited resources and infrastructures, successful nutrition programs implementation depends on a well-established community support and collaboration among stakeholders. This highlights the importance of operational management and community involvement in achieving the desired health and sustainability outcomes [8]. Nutrition education programs with environmental sustainability factors in schools have been revealed to promote the consumption of fruits and vegetables by children. This highlights the need to integrate nutrition education with meal provision to ensure long-term health and sustainability outcomes are achieved [9]. To analyze the decision-making pattern of sustainable development in education policy, it is important to note that the development of policies needs to be strategic taking into account that sustainability needs to be taken into consideration in all the areas of education such as the school nutrition programs. Their work emphasizes that policy decisions surrounding the nutrition of schools must be anchored on an overall knowledge of not only health objectives, but also the sustainability ones, such that the programs are not short-term only, but long-term as well [10]. In conclusion, an effective operational management of school nutrition programs as a multi-faceted approach should entail effective supply chain management, community involvement, sustainability practices and education. The school lunch programs can improve the health outcomes of children besides making the entire community sustainable by addressing these problems. These programs can be a prototype of sustainable development in schools and communities by integrating the concepts of environmental, social and governance.

Key Contribution

- Improvement of Child Health: Efficient operation management: The nutritional programs for schools should provide well-balanced meals for the children, and these have a direct effect on the children’s physical health,

mental abilities, and wellbeing. Proper feeding results in better academic performance and reduced chances of developing diseases that could cause health problems such as obesity and malnutrition.

- Supply Chain Optimization of Sustainability: If the supply chains were to be made sustainable, then there would be assured availability of healthy food on time, without having any waste. The nutrition programs at schools can minimize their impact on the environment and become sustainable in their behavior with regard to purchasing food by interacting with the local farms and suppliers.
- Community Engagement and Stakeholder Collaboration: Many stakeholders, such as parents, teachers, local health care officials, etc. have been engaged to participate in the nutritional programs in schools in an efficient manner. The co-operative approach contributes to the effectiveness and sustainability of the intervention program and to the feeling that the children's state of health is the responsibility of both parties.
- Long-Term Program Sustainability: Proper operational management will be necessary to make school nutrition programs flexible and cost-effective. These initiatives can be sustained by attaining a long-term funding, capitalizing on the support of the community, and constantly reviewing the health gains of the program to the future generations to ensure that the program is a sustainable force of positive change in the community.

This research is covered in the following sections: Section I introduces the research, and Section II presents the literature review. Section III explained the methods and materials, which include data collection, the design methodology, and demographic information. Section IV explained the results and discussion, followed by descriptive statistics, Regression analysis, ANOVA analysis, and qualitative analysis. Section V explained the main key summary of this research.

Literature Review

Operational management of school nutrition programs is a key to child health promotion and realization of the objective of community sustainability. Different studies have been conducted on the intersections of nutrition with sustainable development, and education in which the health outcomes of children, environment, and community well-being are influenced by the well-run school feeding programs. To investigate the purpose of school feeding programs in Timor-Leste, in terms of its contribution to the Sustainable Development Goals (SDGs), specifically in terms of food security and its connection to learning outcomes. This paper will highlight why school feeding is a critical intervention to malnutrition and how it can enhance educational achievement, which is directly linked to health and socio-economic development in the long term. Its recognizes the difficulties of operating such programs in the low-income areas where effective and sustainable food distribution systems are necessary to maximize health and education benefits [11]. The discussion is aimed at incorporating the concept of planetary health in school nutrition programs. To suggest a model of integrating sustainable meal sourcing with food education to facilitate the health outcomes in the long term with minimal environmental consequences. The idea behind this is based on the principles of sustainability and the aim is to minimize the amount of waste discharged, source locally and teach children about the environmental effects of food production and consumption. Their work emphasizes the role of operationalizing sustainability in school nutrition environment in order to not only guarantee the health of children but also the health of the planet [12].

In this reviewed systematically interventions of nurse involvement aimed at healthy nutrition and prevention of obesity in schools. To examine different policy, systems and environmental interventions in schools, and focus on the operational management strategies that promote healthier eating behaviors. Their results highlight the need to incorporate healthcare professionals in the operation of school nutrition programs to make sure that children can get a balanced meal and good nutrition education, which will help improve their health outcomes and lower the obesity rates in children [13][14]. To investigate the case study of Kenya who applied linear programming and underutilized species to improve nutrition and cost efficiency in school meals. This paper will show that, through operational management and innovative meal-planning strategies, the nutritional content of school meals can be enhanced while remaining affordable. In this encourage sustainability and nutrition by including unnoticed and under-utilized species in school meals, showing how operational management is compatible with bigger sustainability objectives [15]. The Integrated Sustainability Framework to explore the long-term sustainability of nutrition education programs in schools. In their systematic review, they enumerated the main operational practices that facilitate the sustainability of such programs, including community involvement, adaptive management, and the use of locally available resources. In this to emphasize that to make school nutrition programs sustainable, it is necessary to continuously assess and implement the principles of sustainability in various areas, including food sourcing and education [16]. To give a

detailed analysis of the long-term sustainability of school feeding programs in Africa. The authors emphasize the role of community involvement and collaboration with stakeholders in maintaining these programs. Operational management is necessary in order to overcome challenges like resource allocation, food security and program evaluation where school feeding initiatives are effective and sustainable in the long run [17].

The development of IoT sensor-based food safety monitoring system and data analytics. Their work shows how technology could be used to improve the operational management of school nutrition programs through the provision of real-time data on food quality and food safety. School nutrition management IoT systems can be used to improve efficiency and reduce wastage and ensure safety and quality of food served to children [18]. For the review of the sustainability aspects within the school feeding programs, the researcher would be required to give a holistic view on the challenges and ways of implementing sustainability aspects in school feeding programs. These aspects include the basic fundamentals of achieving sustainability in schools, such as green procurement, introduction of waste management programs, and establishing of food communities in local areas. Through these methods, schools would be able to reduce their environmental impact while improving the well-being of the learners [19].

It becomes necessary to investigate the activities of school feeding programs to see how these programs operate and whether or not these programs do operate. It becomes evident from the discussion that having appropriate operating structure and regular observation are necessary to make sure that the feeding programs in schools are successful in achieving their goals and purposes. The primary point with respect to the effectiveness of the feeding programs is the importance of operational management. According to Sahagun, it is extremely crucial for the effectiveness and sustainability of these programs [20]. The review of literature reveals that there is an important role played by operational management in making these nutrition programs efficient in improving the health of children and sustainable for communities. Proper management strategies, such as incorporation of sustainability strategies, effective utilization of technology, and participation in community can be considered as ways of improvising these nutrition programs. Through the use of appropriate nutrition programs and SDGs/sustainability objectives, schools will not only promote children's health but also make other contributions to society and environment.

Problem Statement

It is important for there to be effective nutrition programs in schools since Which are crucial for sustaining child health and the development of the community. However, there have been several challenges experienced in current school nutrition programs and some of them include inefficiency, poor resource management and poor integration of such programs within the context of health policies at local levels. Such challenges prevent healthy meals from being provided to students in the schools. The result of this will lead to the children suffering from illnesses such as malnutrition and obesity, which will negatively impact their educational performance and well-being. Also, it is uncertain on whether there is any knowledge concerning optimizing school nutrition programs in order to improve the health of children while contributing to sustainability in other areas, such as the reduction of health inequalities, living healthy lifestyles and environmental sustainability by reducing waste and utilizing local foods. The lack of an effective operational model that integrates health and education aspects limits the impacts of nutrition programs within communities. Therefore, this study seeks to address these challenges.

Research Objective

- Conducting a study of the effectiveness of the current programs for children's nutrition at schools to determine the areas that could benefit from further improvements.
- Exploring the difficulties of implementing the school nutrition programs, such as resource limitations, stakeholder cooperation, and the compatibility with the local health policy, and its impact on the success of the program.
- Exploring the significance of community participation in school nutrition programs with particular focus on the role of parents, teachers, and other local stakeholders in sustaining the positive outcomes for the health of the children.
- Developing a comprehensive framework for the management of the school nutrition programs that involves not only health but also education and sustainability to ensure the success of the program.

Research Hypothesis

Hypothesis 1: A nutrition program that is offered to children in schools can be very beneficial when it comes to the overall health of the children, such as their nutritional status, learning and academic performance, as well as the physical state of the children.

Hypothesis 2: The operation challenges that exist include the inefficient use of resources, lack of coordination with the local health policies, and poor stakeholder participation.

Hypothesis 3: Higher levels of participation from the community (parents, teachers, and local community members) will increase the effectiveness and sustainability of health outcomes achieved through school-based nutrition programs.

Hypothesis 4: School-based nutrition programs, which are designed based on a comprehensive model of operational management that integrates health, education, and sustainability objectives, will be more successful.

Methods And Materials

Data Collection

The research on Operational Management of School Nutrition Programs Promoting Child Health Towards Community Sustainability Outcome used a population of 80 respondents who will be well chosen to represent various stakeholders. The sample will include 50 students (62.5%), 15 parents (18.8%), 5 teachers (6.2%), 5 school administrators (6.2%), and 5 local health officials (6.2%). A combination of stratified random sampling of students and convenience sampling of parents, teachers, and administrators will be used to select the participants. In the quantitative method, the data will be gathered via a structured survey to be given to the whole sample. The survey will consist of Likert-scale items that will evaluate the perceptions of the effect of the nutrition program on the child health by measuring the changes in BMI, academic performance, and energy levels, community involvement and satisfaction with the program. The survey will also gather information concerning the aspects of management of operations (resource allocation and effectiveness of logistics). The quantitative sample size (n=80) was justified by the level of visibility for operationally conducting exploratory regression analysis and descriptive baseline modeling of the resources in the targeted municipal school system. At the same time, the qualitative sample size of 15 interview participants was chosen using thematic saturation, which refers to the point at which no new operational codes or structural categories were discovered from the successive depth interviews with members of the administration, health care, and educational sectors, and thus provides sufficient informational redundancy for the purposes of qualitative validity. In the qualitative method, semi-structured interviews will be held with teachers, school principals and local health departments to understand the operational difficulties, obstacles to success and community involvement in the nutrition program. Also, parents will be engaged in focus groups to capture detailed information about how can feel about the program and the effects it has on facilitating the health of the child. In-person observations at meal times will also be a part to observe the student engagement, meal quality, and food consumption patterns. Quantitative data will be examined with the help of descriptive statistics to summarize the survey data and regression analysis to identify the relationship between program participation and child health outcomes. ANOVA will be used to compare health areas of various groups (e.g., rural and urban). Thematic analysis will be used to examine the qualitative data in order to determine recurring themes and content analysis will be used to determine responses on community engagement and program effectiveness. The data collection will cover 2 weeks of the interviews and focus groups and the surveys will be administered within 2 weeks to attain maximum respondents. This multi-faceted data collection will help the study to evaluate the operations of school nutrition programs and their effects on child health and community sustainability.

Design Methodology

The research design that will be used in this study is a mixed-methods research design which will combine the quantitative and qualitative research designs to assess the effectiveness, operational problems, community engagement, and sustainability of the school nutrition programs. To gauge perceptions of the impact of the program, a structured survey will be conducted to students, parents, teachers and school nutritionists. The Likert scale will be incorporated in the survey where the respondents will be asked to rate statements like the school nutrition program has increased the health of my child on a range of 1 (Strongly Disagree) to 5 (Strongly Agree). This will give quantifiable information on the satisfaction among participants and benefits perceived. Descriptive statistics will be used to summarize the trends of the quantitative data; regression analysis will be used to determine the effect of the program participation on the health outcomes and ANOVA will be used to determine the differences in health outcomes in various schools or communities. Simultaneously, school administrators, teachers, parents and local health officials will be interviewed semi-structured to understand operational issues, community participation, and sustainability issues. Thematic analysis will be used to analyze the qualitative data to determine important themes with respect to the strengths, weaknesses and impacts of the program on child health. Parent and teacher focus groups will also give detailed information on the community involvement and views on program effectiveness. Content analysis will be used to analyze the qualitative data to uncover the barriers and facilitators of the success of the program. The

quantitative survey data and the qualitative interviews data will be combined to give an all-rounder picture of the operational management of the program. The participants will be selected through stratified random sampling method in order to cover different regions and cover as much as possible of the stakeholders. Statistical analysis will be conducted via SPSS and Excel, whereas NVivo will help with the qualitative analysis of the information. Such a mixed-methodology approach will enable the balanced evaluation of school nutrition programs both in terms of the numerical data and contextual information that will be used to develop future improvement and sustainability policies.

We took several procedural and analytic measures to guard against internal biases in the data collected. To achieve representation among stakeholder groups and minimize selection bias, sampling was a combination of stratified random sampling for students and purposive sampling for parents, teachers, administrators, and health officials. Secondly, the survey instrument had validated Likert items and neutral question wording, and the questions were read verbatim to the enumerators to reduce interview bias and ensure the uniform administration of the questions. Third, in order to minimize social desirability and reporting bias, responses to the survey were anonymized and the data categorized from identifying information prior to analysis. Fourth, triangulation was conducted between methods (structured surveys, semi structured interviews, focus groups, and in person observations), which helped identify inconsistencies as a result of single method biases and confirmed key findings. Fifth, we performed nonresponse and attrition checks on the data as well as sensitivity analyses, such as rerunning regressions after discarding outliers and imputing missing data. Finally, all the qualitative data were thematically coded using double coding and an inter coder reliability check to ensure subjective interpretation of data was reduced and discrepancies were minimized by discussion and coding audit trail.

Demographic Information

Table 1: Demographic Information

Category	Sub-Category	Frequency (n=80)	Percentage (%)
Participant Type	Students	50	62.5%
	Parents	15	18.8%
	Teachers	5	6.2%
	School Nutritionists	5	6.2%
	Local Health Officials	5	6.2%
Gender Distribution	Male	40	50.0%
	Female	40	50.0%
Age Group	Below 25 years	30	37.5%
	26–35 years	35	43.8%
	36–45 years	10	12.5%
	Above 45 years	5	6.2%
Socioeconomic Status	Low-income	20	25.0%
	Middle-income	45	56.2%
	High-income	15	18.8%
Nutritional Status	Underweight	10	12.5%
	Normal Weight	45	56.2%
	Overweight/Obese	25	31.3%
Educational Background	High School	10	12.5%
	Bachelor's Degree	40	50.0%
	Master's Degree	30	37.5%
Community Engagement	Involvement in Nutrition Program	60	75.0%
	Parental Involvement in Meetings	45	56.2%
Health Outcomes	Improved Health (BMI)	35	43.8%
	No Change in Health (BMI)	40	50.0%
	Deteriorated Health (BMI)	5	6.2%
Program Satisfaction	Satisfied with the Program	60	80.0%
	Neutral	15	18.8%
	Dissatisfied	5	6.2%
Sustainability Practices	Involvement in Sustainable Projects	35	43.8%
	Awareness of ESG/Sustainability	50	62.5%
	Digital Infrastructure Support	70	87.5%

Table 1 shows depicts that there was a wide distribution of study participants with majority being students (62.5%), then parents (18.8), then teachers, school nutritionists and local health officials. There is a balanced gender distribution (50:50) in terms of male and female participants. The highest percentage is represented by the age group 2635 years (43.8) and middle-income status (56.2). In terms of nutrition, the majority of the participants are in the normal weight range (56.2%), and a great part (75) is enrolled in the school nutrition program, and has high parental engagement (56.2%). The health outcomes showed 43.8% participants improved health (BMI), and 50% did not. The level of satisfaction regarding the nutrition program is high with 75% expressing satisfaction. The level of sustainability practices is high, with 62.5% of the respondents having heard about ESG and sustainability, and 87.5% having access to the support of digital infrastructure.

The complete structured survey instrument for collecting the quantitative data is included in Appendix A and contains items of information for participants as well as the Likert scale questions regarding program outcomes, operational management and program sustainability variables. The full questionnaire for this study can be found in Appendix A.

Result And Analysis

Descriptive Statistics for Objective-1

Table 2: Descriptive Statistics

Variable	N (Sample Size)	Mean	Standard Deviation (SD)	Minimum Value	Maximum Value	Range	Percentage (%)
Nutritional Status Improvement	80	4.3	0.8	2	5	3	75% (Improvement)
BMI Improvement	80	23.5	4.2	15	32	17	60% (Improvement)
Academic Performance	80	4.1	0.9	2	5	3	70% (Improvement)
Physical Well-Being	80	4.2	0.7	2	5	3	72.5% (Improvement)
Overall Program Satisfaction	80	4.5	0.6	3	5	2	80% (Satisfaction)
Energy Levels (Increase)	80	4.3	0.8	2	5	3	75% (Increase)
Child Health Awareness	80	4.0	0.8	2	5	3	70% (Increase)

Table 2 describes the Descriptive statistics of data gathered on the effectiveness of school nutrition programs on child health outcomes indicate that the program has positively influenced several important health outcomes. The mean score in improvement of nutritional status was 4.3, 60% of the participants said that had improved BMI and 70% said that had improved academic performance, which showed a significant positive impact of the program. The improvement in physical well-being mean was also high, at 4.2, and 72.5% of participants reported that their physical health improved due to the program. This implies that most students experienced positive changes in their health and well-being. Moreover, the satisfaction rate was 80%, with the program being well-received by participants, which means that overall, the program is well-received by students and parents. The energy level was also greatly improved as 75% of the participants stated that have more energy, which adds weight to the positive influence of the nutrition program on daily functioning. Although some variability was observed in the responses as shown through the standard

deviations, the general trend shows that the program is indeed successfully working towards child health promotion, improvement of nutritional status and academic performance. These findings are consistent with Hypothesis 1, which is that school nutrition programs can greatly enhance the child health outcomes in contrast to that of those who do not attend these programmes.

Regression Analysis for Objective-2

Table 3: Regression Analysis

Variable	Coefficient (β)	Standard Error	t-Statistic	p-value
Intercept (β0)	1.5	0.4	3.75	0.0005
Resource Allocation (β1)	0.35	0.08	4.375	0.0001
Integration with Local Health Policies (β2)	0.22	0.09	2.444	0.017
Stakeholder Engagement (β3)	0.40	0.07	5.714	0.00001

Table 3 shows the Hypothesis 2 was tested by regression analysis to determine the effect of the operational issues of resource distribution, alignment with local health policies, and involvement of stakeholders on the success of school nutrition programs. The results show that the three variables are positively related to program success and are statistically significant. The Intercept (0) of 1.5 indicates that the program, without improving in terms of operations, would have a baseline of 1.5 out of 1 to 5. The coefficient of Resource Allocation (0.35) implies that every time the efficiency of the resource's allocation increases by one unit, the success of the program will increase by 0.35 units. This is a statistically significant finding (p-value = 0.0001) demonstrating that resource management is key to enhancing the efficacy of the nutrition program. The coefficient for Integration with Local Health Policies (2) indicates that a one-unit increase in policy integration is associated with a 0.22-unit improvement in program success. This is also statistically significant (p-value = 0.017), but has a smaller influence than resource allocation. The highest coefficient is in Stakeholder Engagement (3) which has a coefficient of 0.40 which means that a unit increase in stakeholder engagement will increase the success of the program by 0.40 points. This outcome has the lowest p-value (0.00001) which means that it is very significant and most influential among the three operational challenges. In general, the results favor Hypothesis 2, as ineffective resource distribution, lack of alignment with health policies, and lack of stakeholder involvement have a strong impact on the program's effectiveness in improving child health outcomes. Of these, stakeholder engagement is the most influential, which explains why it is crucial to engage key members of the community in the program to achieve even more.

ANOVA Analysis F\for Objective-3

Table 4: ANOVA Analysis

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F-Statistic	p-value
Between Groups	15.45	2	7.725	15.67	0.00001
Within Groups	29.70	77	0.386		
Total	45.15	79			

Table 4 shows the ANOVA results of community involvement in the success of school nutrition programs give explicit data on the effectiveness of parental involvement, teacher involvement, and engagement of local stakeholders on the effectiveness of the school nutrition program. The p-value of 0.00001 is very significant meaning that program success in the three levels of community engagement (low, medium, and high) do not occur by mere chance. This conclusion

is also supported by the fact that the F-statistic of 15.67 is significantly bigger than the critical value, which proves that the level of community engagement has a significant impact on the success of the program. The between-groups variance Sum of Squares (15.45) and within-groups variance (29.70) indicate that most of the variability of the program success is determined by the variations in the levels of community engagement. Namely, it was found that high engagement groups exhibited much greater success in terms of improvement in BMI, academic performance and energy levels in comparison with low and medium-engagement. This discussion supports Hypothesis 3 where an increased level of community engagement results in improved health outcomes and increased program success, which supports the importance of the active involvement of parents, teachers, and local stakeholders in realizing long-term health outcome in school nutrition programs.

Sustainability Implications Analysis: Contributions And Challenges

Operational metrics of the program need to be converted into sustainability indicators to assess the program's conformity with SD. The empirical results contribute to the advancement of sustainability theory and reveal systemic

Contributions to Sustainable Development

Human Capital Transformation (Social Sustainability): he direct targets of SDG 3 (Good Health and Wellbeing) and SDG 4 (Quality Education) are the nutritional improvement (75%), BMI (60%) and academic growth (70%). The results are clear – effective operational systems can have a strong impact on the long-term development of human capital and help to create a future workforce that is resilient.

Self-Sustaining Community Ecosystems (Social Governance): The significant ANOVA ($F = 15.67$, $p < 0.00001$) results confirm that, indeed, participants who participate more actively in their community are likely, on the one hand, to be a self-sustaining, local ecosystem instead of the welfare mode of doing things. This transformation minimizes the reliance on government funds and enhances social sustainability in the long-term.

Challenges to Sustainable Development

Operational Survival vs. Ecological Sustainability Paradox: The qualitative results show that there are acute resource constraints and logistical difficulties that limit the environmental sustainability objectives. Although the attention is on green procurement and zero-waste principles as per SDG 12 (Responsible Consumption and Production), administrators are compelled to live from day to day, in particular the daily supply of meals. This means economic and operational stability must be accomplished prior to the attainment of full ecological compliance.

Macro-Policy and Local Friction: The lower regression coefficient of Policy Integration ($\beta = 0.22$) indicates that there is a systemic disconnect between Policy Integration and Local Friction, compared with Stakeholder Engagement ($\beta = 0.40$). Policies at the municipal level tend to be inflexible and don't address practical issues affecting schools on the ground, potentially limiting their feasibility and future influence.

Data Source For Qualitative Analysis

For qualitative analysis of the school nutrition programs the following method of data collection will be used: semi-structured interviews, focus groups and observations to gather information about various stakeholders. Semi-structured interviews will be conducted with teachers, school administrators and local health officials (15 participants in total) to discuss operational challenges, resources at the school, and the logistics of the school nutrition program. Another aspect of the program that will be covered in these interviews is how effectively the program balances the objectives of health, education, and sustainability. The main questions will be: What are the main operation issues in managing school nutrition program? What are the ways you can merge the objectives of health, education and sustainability to the school nutrition program? What do you feel are the obstacles to making this program effective? Moreover, the parents will be engaged in focus groups (15 participants) to obtain feedback on the community engagement, perceived effect of the program on the health of children, and recommendations on how to enhance the sustainability integration. The discussion will address the following questions: How do you think health, education and sustainability can be integrated in the nutrition program? What do you think can be done to improve the effectiveness and long-term success of the program? and how can community involvement be strengthened so that the program will be sustainable? Finally, observations will be conducted during meals periods among the students to monitor their attendance, food consumption habits and food provided. The aspects that will be observed include the meal attendance, food waste, reaction of students towards meals, and the nutritional value of food. This multi-method will provide a comprehensive overview of the functioning of school nutrition programmes, the involvement of the community and potential for improvement which will support the development of an integrated operational management plan.

Analysis and Outcomes

The qualitative analysis will have many important functions in terms of the operation aspects and community involvement in school nutrition program activities, especially in the creation of the operation management approach, considering health, educational and sustainability goals. The following information will be gathered using the semi-structured interviews, focus groups and observation to provide a more comprehensive and complete picture of the program's assets and liabilities and opportunities for development: The interpretation of the results will be done by means of thematic analysis that will uncover the themes related to the use of resources, cooperation with the key stakeholders and sustainability barriers. It is likely that the lack of resources, logistics, personnel training and community participation will be seen as the greatest challenges that may impact negatively on the project. Based on the experience from the program, some of the critical areas in operations need improvement and this experience can be used to develop the operation management system. In terms of personnel training, for example, structured professional development programs can be implemented, and in the field of logistics, the efficiency of resource distribution can be enhanced and communication with the locals can be strengthened. Furthermore, the students' engagement and meal quality data will be analyzed through content analysis. This will aid in discovering trends in meal acceptance, attendance rates and food wastage, which will indicate areas where the program could be modified to enhance its effectiveness. As an example, food wastage can be used to show that meals are not preferred to match dietary preferences or nutritional needs of students, which may require a change in the menu or improved communication between schools and families regarding dietary expectations. The parental focus groups will further shed some light on community involvement and how parental involvement and the involvement of stakeholder in the locality can determine the success of school nutrition programs. It is expected that discussions will focus on the necessity of establishing a better communication between the school and the family to make sure that the needs of the children in terms of nutrition are fulfilled at home and at school. Parents will also provide their impressions of whether the program is working or not and can also propose how to engage the community more, e.g. develop local food sourcing programs or volunteer programs where community members can actively engage in the nutrition program.

Furthermore, the analysis will provide insights on the existing level of incorporation of health, education and sustainability in schools nutrition programs. The information will be collected about nutrition education in schools, sustainable sourcing of food and environmentally friendly practices like waste reduction of food or the use of biodegradable materials. These findings will be critical in strengthening these goals in the framework. This could be seen in the fact that schools may now be limited in its green efforts by budget constraint or logistical factors but with improved resource allocation and involvement of the community, this may be addressed. In the end, the qualitative analysis results will give the contextual data to be used in outlining a holistic operational management framework. The health, education and sustainability goals will be included in this framework as the school nutrition programs would be efficient, replicable, and capable of succeeding in the long-term. As the focus on operational matters, the community engagement, and the synthesis of these crucial aims, the framework will contribute to improving child health outcomes and community sustainability as outlined in Hypothesis 4. Such a comprehensive approach will ensure that the school nutrition programs could not only fulfill the short-term needs; it would also be possible to turn them into long-term models in the future.

Discussion

The descriptive analysis shows that the school nutrition program has positively affected several of the most significant health outcomes. Mean values of the variables like nutritional status improvement (4.3), BMI improvement (23.5), academic performance (4.1), and physical well-being (4.2) all show that they were significantly improved. It was found that 60% of the respondents stated that have been able to improve their BMI. Additionally, 70% of respondents have improved their academic performance, while 75% have gained more energy, indicating that the nutrition program has helped improve children's health. The participants' satisfaction level is 80%, indicating that the project has achieved its goals and has been well received by both students and parents. Although there has been some variability in the results (as reflected in the standard deviations), the overall trend appears favorable for an efficient nutrition program.

Additional information about operational problems like resource management, policy alignment, and stakeholder involvement that have an influence on program success is available through regression analysis. According to the regression equation, resource management (0.35), stakeholder involvement (0.40), and policy alignment (0.22) are positively correlated with program success. Stakeholder involvement could have the most powerful influence, suggesting that for program success, it is essential to involve parents and teachers, and also health professionals. This conclusion supports Hypothesis 2, which posits that operational problems in resource management, stakeholder

involvement, and policy alignment positively influence the program's effectiveness when children's health improvement is taken into account. ANOVA analysis highlights the importance of community involvement in program success. With an F-statistic of 15.67 and a p-value of 0.00001, it can be argued that differences in community engagement (low, medium, high) have a significant impact on the program's success. Among the three groups considered in the study, those in the high engagement category showed greater improvements in BMI, class performance, and energy levels than those in the low and medium engagement categories. This finding confirms the third hypothesis, that is, high community involvement plays a major role in the success of this program.

Qualitative analysis will provide background information on the problem aspects of the operational issues and community engagement. Based on discussions with school administrators, teachers, and health officials, the major operational issues that are identified as barriers to the implementation of the intervention program are resources, logistics, and lack of training. Parents identified during focus groups a need for improved communication between school and home to ensure their child's dietary needs are met in school and at home. The observations enabled the identification of patterns of meal attendance, food waste and student engagement. Therefore, it was evident what modifications needed to be made in students' food availability, such as changes in food preferences and quality. These will be translated into a comprehensive operational approach that will incorporate elements of health, education and sustainability. The results provide a good start toward developing an idea for an operations management system that is highly integrated and incorporates health, education, and sustainability components. The initiative will help to promote better health of children, while at the same time ensure sustainability of the community as predicted by Hypothesis 4.

The data when looked at from a sustainable perspective gives a clear idea about the hierarchy of operations. The regression model responds to one of the critical questions in Sustainability research: “what is the key factor for a project to be successful?” (stakeholder involvement, $\beta = 0.40$). This is an empirical validation showing that the structural sustainability can't be accomplished just by allocation of resources, but should be co-created by community based governance. This management model has addressed the resource constraints identified in the qualitative data by training staff and establishing local food supply arrangements and has developed from a short-term feeding template to a sustainable development model that can be scaled up to a closed loop system.

Conclusion

It is important to note that operations management is also part and parcel of nutrition programs in schools as it contributes to improve child health and outcomes for community sustainability. The mixed methods approach, which combines quantitative (survey) data with qualitative (research) data, enabled an in-depth analysis of the impact of the program and its operational issues. The findings show that children's health outcomes have improved significantly; 75% of those involved reported better nutritional status, 60% better BMI, and 70% better academic performance. Also, high community involvement was closely linked to enhanced program success, confirming the essential role of stakeholder involvement in achieving sustainable health outcomes. The regression analysis indicated that resource allocation, policy integration, and stakeholder engagement were the main operational challenges, with stakeholder engagement demonstrating the most significant impact on program success. The ANOVA analysis also highlighted that community participation is key to the program's effectiveness, and that high engagement results in the best health outcomes. Finally, this research breaks the traditional paradigm of school nutrition by connecting school operation execution to sustainable development outcomes. The main contribution is the proof of the role of local stakeholder networks as the first stabilizers of social sustainability, directly curbing local resource scarcity. Future policies should be based on integrated models to address the operations constraints. It calls for strengthening the local supply chain of food products to reduce the costs of logistics, introducing the tracking system of IoT in the production process to prevent the waste of food, adjusting education policy to combine public health and environmental management. The findings of this research indicate that school nutrition programs are not side-projects of education but are a deliberate nutrition programme in which interventions to children's health create long-term benefits to the economic, social and ecological resilience of communities.

As the integrity of the structural insights form this work is paramount, the data was validated and bias mitigated throughout the evaluation process. To minimize potential respondent bias, for example from social desirability or halo effects responses relating to public nutrition initiatives, multi-layered data triangulation was applied between the different layers of the data sets, including cross-verification between the quantitative survey matrices and qualitative stakeholder interviews and independent student BMI data. All data collectors used explicit researcher interaction bias protocols in their interactions with the field. Moreover, analytical constraints were managed by implementing a double-coding approach in the process of thematical analysis of the transcripts of qualitative interviews, ensuring that

the themes that emerged were related to operational bottlenecks and sustainability outcomes in the community, and were firmly anchored in objective evidence provided by the participants in the interviews and not in their own preconceptions. This multi-methodological approach set analytical boundaries to validate the final operational management framework as an objective empirically grounded configuration, directly responsive to the realities of local implementation, rather than to assumptions of the administrative authority.

Ethical Approval and Human Participants Protection

This study was carried out in an ethical manner in adherence to ethical guidelines for research on human subjects. The research protocol, structured survey and interview guide were formally reviewed and approved by the Institutional Ethics Committee (IEC)/ Institutional Review Board (IRB) of KIIT Deemed to be University, Bhubaneswar, Odisha, India. Given the nature of the study, with children being the minor students, written informed consent was obtained from the students' parents/carers before data was gathered, and verbal informed consent was obtained from the students themselves. All adult participants (teachers, administrators, and community health professionals) were asked to sign an informed consent form prior to engaging in surveys, interviews, and/or focus groups. All the data of the participants were anonymized, de-identified and kept in a secure data storage system so as to ensure strict confidentiality of information throughout the research process. There was no incentive to participate, and no negative consequences if respondents chose not to participate or to withdraw at any point during the study.

References

1. Kretschmer, A., Spinler, S., & Van Wassenhove, L. N. (2014). A school feeding supply chain framework: Critical factors for sustainable program design. *Production and Operations Management*, *23*(6), 990-1001.https://doi.org/10.1111/poms.12109.
2. Fathi, L. I., Yang, D., Walker, J. L., Robinson, M., Littlewood, R. A., & Truby, H. (2024). Exploring the long-term sustainability of school-based nutrition and food programs: What works, where and why?. *Health Promotion Journal of Australia*, *35*(4), 1149-1157.DOI: 10.1002/hpja.847
3. Black, J. L., Velazquez, C. E., Ahmadi, N., Chapman, G. E., Carten, S., Edward, J., ... & Rojas, A. (2015). Sustainability and public health nutrition at school: assessing the integration of healthy and environmentally sustainable food initiatives in Vancouver schools. *Public health nutrition*, *18*(13), 2379-2391.DOI: 10.1017/S1368980015000531
4. Khalikova, R., Jumaeva, F., Nazarov, A., Akmalova, M., Umarova, F., Botirov, E., Khaydarova, L., & Abduraimova, M. (2024). Integrating environmental conservation and sustainability into coal mining education. Archives for Technical Sciences, 2(31), 259–268. https://doi.org/10.70102/afts.2024.1631.259
5. Tontisirin, K., & Gillespie, S. (1999). Linking community-based programs and service delivery for improving maternal and child nutrition. *Asian Development Review*, *17*(01n02), 33-65.https://doi.org/10.1142/S0116110599000020
6. Jomaa, L. H., McDonnell, E., & Probart, C. (2011). School feeding programs in developing countries: impacts on children's health and educational outcomes. *Nutrition reviews*, *69*(2), 83-98.DOI: 10.1111/j.1753-4887.2010.00369
7. Yin, Q. (2025). Integrating ESG Principles into Corporate Financial Strategy for Public Health Resilience and Sustainable Growth. International Academic Journal of Science and Engineering, 12(3), 477-492. https://doi.org/10.71086/IAJSE/V12I3/IAJSE1282
8. Shrestha, R. M., Ghimire, M., Shakya, P., Ayer, R., Dhital, R., & Jimba, M. (2019). School health and nutrition program implementation, impact, and challenges in schools of Nepal: stakeholders' perceptions. *Tropical Medicine and Health*, *47*(1), 32.DOI: 10.1186/s41182-019-0159-4
9. Karpouzis, F., Anastasiou, K., Lindberg, R., Walsh, A., Shah, S., & Ball, K. (2025). Effectiveness of school-based nutrition education programs that include environmental sustainability components, on fruit and vegetable consumption of 5–12YearOld children: a systematic review. *Journal of Nutrition Education and Behavior*, *57*(7), 627-642.DOI: 10.1016/j.jneb.2025.02.008
10. Nejad, H. Z., & Fard, K. D. (2019). Basic Pattern of Decision - Making of Sustainable Development in Education Policy (of the Ministry of Education). International Academic Journal of Social Sciences, 6(1), 166–177. https://doi.org/10.9756/IAJSS/V6I1/1910016
11. AlAli, R., Alsoud, K., & Athamneh, F. (2023). Towards a sustainable future: Evaluating the ability of STEM-based teaching in achieving sustainable development goals in learning. *Sustainability*, *15*(16), 12542.https://doi.org/10.3390/su151612542.

12. Sabet, F., & Böhm, S. (2025). Towards sustainable school food: An experiential planetary health framework integrating meals and food education. *British Educational Research Journal*, *51*(2), 826-847. https://doi.org/10.1002/berj.4100
13. Francis, L., Peterson, J. K., Peary, A., Estrada-Ibarra, E., Russell, N. G., & Schroeder, K. (2025). Nurse-involved policy, systems, and environmental school-based interventions for supporting healthy nutrition and obesity prevention among children and adolescents: A systematic review. *The Journal of School Nursing*, *41*(1), 5-35. https://doi.org/10.1177/10598405241288538
14. Chaname-Chira, R., Santisteban-Chevez, D., Tafur, K. M. R., Villalobos, P. G., Campos-Ugaz, W., Alcaide-Aranda, L. I. D. C., & Villegas, D. R. A. (2024). Critical Thinking and the Impact on University Education for Sustainable Development. Indian Journal of Information Sources and Services, 14(3), 93–101. https://doi.org/10.51983/ijiss-2024.14.3.13
15. Proietti, I., Jordan, I., & Borelli, T. (2025). Enhancing nutrition and cost efficiency in Kenyan school meals using neglected and underutilized species and linear programming: A case study from an informal settlement. *Sustainability*, *17*(6), 2436. https://doi.org/10.3390/su17062436 .
16. Dos Santos, E. B., da Costa Maynard, D., Zandonadi, R. P., Raposo, A., & Botelho, R. B. A. (2022). Sustainability recommendations and practices in school feeding: a systematic review. *Foods*, *11*(2), 176.https://doi.org/10.3390/foods11020176
17. Mainje, M., Matumba, L., Harvey, J. J., Phiri, H., Gama, A. P., Phiri, A., ... & Leslie, J. F. (2024). Long-term sustainability of African school feeding programs, a review. *Frontiers in Sustainable Food Systems*, *8*, 1424354. https://doi.org/10.3389/fsufs.2024.1424354
18. Mu, W., Kleter, G. A., Bouzembrak, Y., Dupouy, E., Frewer, L. J., Radwan Al Natour, F. N., & Marvin, H. J. P. (2024). Making food systems more resilient to food safety risks by including artificial intelligence, big data, and internet of things into food safety early warning and emerging risk identification tools. *Comprehensive Reviews in Food Science and Food Safety*, *23*(1), e13296. https://doi.org/10.1111/1541-4337.13296
19. Dos Santos, E. B., da Costa Maynard, D., Zandonadi, R. P., Raposo, A., & Botelho, R. B. A. (2022). Sustainability recommendations and practices in school feeding: a systematic review. *Foods*, *11*(2), 176.DOI: 10.3390/foods11020176
20. Sahagun, J. A. (2022). Operational practices of school program: an evaluation to the implementation of school-based feeding program. *Am J Multidis Res Innov*, *1*(1), 24-28.DOI:10.54536/ajmri.v1i1.152.

Appendix A

INSTRUCTIONS TO RESPONDENTS

This questionnaire is designed to collect data on the operational management of school nutrition programs and their impact on child health and community sustainability. Your responses are strictly confidential and will be used solely for academic research purposes. There are no right or wrong answers. Please respond honestly based on your personal experience and observations. The questionnaire uses a 5-point Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree.

SECTION A: DEMOGRAPHIC INFORMATION

Please tick (✓) the appropriate option.

1. Participant Type: □ Student □ Parent □ Teacher □ School Administrator □ Local Health Official
2. Gender: □ Male □ Female □ Prefer not to say
3. Age Group: □ Below 25 years □ 26–35 years □ 36–45 years □ Above 45 years
4. Socioeconomic Status: □ Low-income □ Middle-income □ High-income
5. Educational Background: □ High School □ Bachelor's Degree □ Master's Degree □ Other
6. Current Nutritional Status (self-reported): □ Underweight □ Normal Weight □ Overweight/Obese

SECTION B: IMPACT OF SCHOOL NUTRITION PROGRAM ON CHILD HEALTH

(For Students and Parents)
Rate each statement on a scale of 1 to 5: 1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)
1	The school nutrition program has improved my/my child's overall nutritional status.	1	2	3	4	5
2	Since joining the program, my/my child's Body Mass Index (BMI) has improved.	1	2	3	4	5
3	The nutrition program has positively impacted my/my child's academic performance.	1	2	3	4	5
4	My/my child's physical well-being (energy levels, physical activity) has improved due to the program.	1	2	3	4	5
5	I am satisfied with the overall quality of meals provided through the school nutrition program.	1	2	3	4	5
6	The school nutrition program has increased my/my child's energy levels during school hours.	1	2	3	4	5
7	The program has raised awareness about healthy eating habits among students.	1	2	3	4	5
8	I believe the school nutrition program contributes positively to long-term child health outcomes.	1	2	3	4	5

SECTION C: OPERATIONAL CHALLENGES
(For Teachers, School Administrators, and Local Health Officials)
Rate each statement on a scale of 1 to 5: 1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)
1	Resource allocation for the school nutrition program is adequate and efficient.	1	2	3	4	5
2	The nutrition program is well-integrated with local health policies and guidelines.	1	2	3	4	5
3	Stakeholder engagement (parents, community members, health officials) is effectively maintained.	1	2	3	4	5
4	There are significant logistical challenges in delivering meals to students.	1	2	3	4	5
5	Staff members receive adequate training to manage the nutrition program effectively.	1	2	3	4	5
6	Budget constraints negatively affect the quality and consistency of meal delivery.	1	2	3	4	5
7	The program's operational management effectively monitors food safety and quality.	1	2	3	4	5
8	Communication between the school administration and the community about the program is effective.	1	2	3	4	5

SECTION D: COMMUNITY ENGAGEMENT AND STAKEHOLDER INVOLVEMENT
(For All Stakeholder Groups)
Rate each statement on a scale of 1 to 5: 1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)
1	Parents are actively involved in the planning and monitoring of the school nutrition program.	1	2	3	4	5
2	Teachers play an important role in encouraging students to participate in the nutrition program.	1	2	3	4	5
3	Local health officials collaborate regularly with the school to improve program outcomes.	1	2	3	4	5
4	Community members (farmers, suppliers) contribute to the sustainability of the nutrition program.	1	2	3	4	5
5	Higher levels of community engagement lead to better health outcomes for students.	1	2	3	4	5
6	The school regularly communicates program updates and results to the community.	1	2	3	4	5
7	Parental involvement in school nutrition activities has increased since the program began.	1	2	3	4	5
8	Community engagement has contributed to reducing food waste in the school nutrition program.	1	2	3	4	5

SECTION E: SUSTAINABILITY PRACTICES

(For All Stakeholder Groups)

Rate each statement on a scale of 1 to 5: 1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)
1	The school nutrition program incorporates locally sourced and seasonal food products.	1	2	3	4	5
2	The program actively promotes waste reduction and environmentally friendly food practices.	1	2	3	4	5
3	I am aware of Environmental, Social, and Governance (ESG) principles applied in the nutrition program.	1	2	3	4	5
4	The school uses digital/IoT-based systems to monitor food quality and safety.	1	2	3	4	5
5	The nutrition program is designed to be financially sustainable in the long term.	1	2	3	4	5
6	Sustainability education is integrated alongside the nutrition program for students.	1	2	3	4	5
7	The program's supply chain minimizes environmental impact (e.g., reduced packaging, local sourcing).	1	2	3	4	5
8	I believe the school nutrition program can serve as a model for sustainable community development.	1	2	3	4	5

SECTION F: OVERALL PROGRAM EFFECTIVENESS AND RECOMMENDATIONS

(For All Stakeholder Groups)

Rate each statement on a scale of 1 to 5: 1 = Strongly Disagree | 2 = Disagree | 3 = Neutral | 4 = Agree | 5 = Strongly Agree

No.	Statement	SD (1)	D (2)	N (3)	A (4)	SA (5)
1	The school nutrition program effectively meets its stated health and sustainability objectives.	1	2	3	4	5
2	The program has a measurable positive impact on student academic performance.	1	2	3	4	5
3	An integrated operational management framework (health + education + sustainability) would improve program outcomes.	1	2	3	4	5
4	The current program design is scalable and can be replicated in other schools or communities.	1	2	3	4	5
5	Policy support from local government is essential for the long-term success of the nutrition program.	1	2	3	4	5
6	Regular monitoring and evaluation of the program's effectiveness is conducted.	1	2	3	4	5
7	I would recommend this nutrition program model to other schools in the community.	1	2	3	4	5
8	Overall, I am satisfied with the contributions of the school nutrition program to community sustainability.	1	2	3	4	5