



Exploring Standard Child Nutrition
Key Performance Indicators

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Exploring Standard Child Nutrition Key Performance Indicators

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Institute of Child Nutrition

The University of Mississippi

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EXPLORING STANDARD CHILD NUTRITION KEY PERFORMANCE INDICATORS

EXECUTIVE SUMMARY

Successful school nutrition (SN) directors must be able to decide where to focus their time and resources. Data driven decision making, utilizing key performance indicators (KPIs), is an effective approach. Data driven decision making is the process of using operational data commonly collected by SN programs to make informed decisions about planning and implementing change (Boettger, 2009). The KPIs are metrics that allow SN professionals to utilize a rigorous numbers oriented approach to target specific areas of emphasis, and gauge results in an objective and measurable way (Buzalaka, 2010).

Several KPIs that are useful for decision making in SN programs have been identified in literature. That list includes: costs per revenue (e.g., food, labor, supply, equipment, other, and total), fund balance as a percent of revenue, breakfast and lunch participation rates (by grade and school), meals per labor hour, costs per meal (food, labor, supply, equipment, other, and total), inventory on hand, and revenue per student. (Boettger, 2009; Council for Great City Schools [CGCS], 2012; and Cater, Conklin, and Cross 2005).

Currently, there is a lack of research concerning SN professionals' usage or perceptions of KPIs as tools to support SN program management. Therefore, the purpose of this study was to explore SN directors' usage and perceptions of KPIs. The specific objectives were to determine the following: school nutrition directors' access to data for calculating KPIs; school nutrition directors' perceptions of KPIs; school nutrition directors' usage of KPIs, the relationship between SN directors' personal characteristics and usage/perceptions of KPIs; and the relationship between SN program characteristics and usage/perceptions of KPIs.

This project, which received approval from the Institutional Review Board at The University of Southern Mississippi prior to implementation, was conducted in four phases. In Phase I, the primary investigator visited an SN program where the director had demonstrated success in utilizing KPIs for operational decision making. In Phase II, an expert panel of SN professionals experienced in applying KPIs was convened to discuss issues associated with utilizing KPIs in SN programs. The intent of Phase I and II of the study was to gather information to support the development of a national survey to meet the objectives of the study. In Phase III, a national survey was developed and validated with the assistance of a review panel of SN professionals. The survey was then mailed to a random sample of 700 SN directors representing the seven United States Department of Agriculture regions. Survey data were analyzed using the statistical package SPSS Version 21.0 for Windows. In Phase IV, a “think tank” consisting of eight SN professionals experienced in applying KPIs met to identify the best format of training resources to support school nutrition professionals’ effective utilization of KPIs for operational decision making and program evaluation.

The response rate for the survey was 29.3% (N=205). Most respondents were from districts with student enrollments between 2,000 and 29,000 (65.0%). More than one-third of respondents indicated that they had worked in SN programs for greater than 20 years (37.6%); however, the largest percentage of respondents indicated they had only been in their current position for 1 to 5 years (34.0%).

When respondents were asked to rate the level of understanding of SN KPIs on a three point scale (3=adequate, 2=partial, and 1=no understanding), the KPIs that received the highest mean ratings were “average daily participation” (2.95 ± 0.27), “meals per labor hour” (2.87 ± 0.38) and “cost per meal” (2.84 ± 0.41). The KPIs that received the lowest mean ratings

regarding level of understanding by respondents were “percent over production” (2.25 ± 0.76), “inventory turnover rate” (2.54 ± 0.63), and “days of inventory on-hand” (2.58 ± 0.62).

When respondents were asked to rate their level of agreement with the statement “School nutrition professionals receive adequate training on KPIs,” 81.6% disagreed or strongly disagreed. Additionally, the majority of respondents reported that cooks, school level managers, and district level supervisors, either do not receive training on KPIs, or they did not know if individuals in these positions receive KPI training (91.0%, 60.0%, and 53.0%, respectively).

The most common frequency reported for calculating average daily participation, meals per labor hour, cost as a percent of revenue, and revenue per meal was “monthly” (53.0%, 35.6%, 34.5%, and 30.7%, respectively). The most common frequency reported for calculating cost per meal was “annually” (33.5%). The majority of respondents reported they never calculate percent over production, staff turnover rate, and inventory turnover rate (58.6%, 53.4%, and 50.2%, respectively).

When respondents were asked to indicate what level of SN professionals other than themselves in their school district use SN KPIs, the majority said district level supervisors (57.2%). The largest percentage of respondents reported that cooks and school level managers do not use SN KPIs (78.9% and 47.3%, respectively).

One-way ANOVA and Tukey’s post hoc comparisons demonstrated a significant relationship between district enrollment and respondents’ perceived understanding of four KPIs. As school district enrollment size increased from $\leq 1,999$ to 2,000-29,999, respondents’ perceived level of understanding of meals per labor hour and breakeven point significantly increased ($p < 0.05$ and $p < 0.05$, respectively); however, no significant differences were observed for the same KPIs between districts with enrollment of $\leq 1,999$ and districts with enrollment

of $\geq 30,000$ or between districts with enrollments of 2,000-29,999 and $\geq 30,000$. Additionally, it was observed that respondents' perceived level of understanding of cost as a percentage of revenue and revenue per meal significantly increased as school district size increased from $\leq 1,999$ to 2,000-29,999 ($p < 0.05$ and $p < 0.05$; respectively) and from $\leq 1,999$ to $\geq 30,999$ ($p < 0.05$ and $p < 0.05$; respectively).

Think Tank Results

Think tank participants recommended that the target audience for the resource should be unit and district level SN managerial staff at all school districts regardless of district size. Three primary uses of the resource were identified: an operational guide, a communication tool, and a staff development instrument. It was recommended that the resource contain the following nine sections: Table of Contents, Introduction, Key Terms, Key Performance Indicators, Systems for Collecting and Organizing KPI Data, Continuous Improvement Model for Using KPIs, Case studies using KPIs, Appendices, and Index.

Based on the findings of this study, additional research is needed to develop a resource that supports SN directors, managers, and supervisors regardless of district size in effectively utilizing KPIs. This resource should be based on the information captured in Phase IV of this study.

INTRODUCTION

School nutrition (SN) management is a challenging profession. Regulations and guidelines are continually changing, budgets are often lean, costs are routinely rising, and customers are usually demanding. Thriving in this environment requires effective decision making. Successful SN directors must be able to decide where to focus their time and resources. They need to know where costs can be reduced, where revenues can be increased, and how to evaluate the impact of their efforts. Data driven decision making, utilizing key performance indicators, (KPIs) is an effective approach.

Data driven decision making is the process of using operational data commonly collected by SN programs to make informed decisions about planning and implementing change (Boettger, 2009). The operational data that is used to track the most important aspects of an SN operation are called KPIs (Boettger, 2009). Fahey (2011) described KPIs as measures of performance that allow school officials to identify problem areas, measure progress in correcting these problems, and demonstrate program efficiency and effectiveness. Buzalaka (2010) described KPIs as metrics that allow SN professionals to utilize a rigorous numbers oriented approach to target specific areas of emphasis and gauge results in an objective and measurable way. The KPIs can be used to help identify where resources should be invested to have the most positive impact (such as equipment or labor), and they can be used to track the progress of major initiatives (such as breakfast in the classroom, salad bars, and farm to school) on participation, cost, and revenue (Buzalaka, 2010).

Several KPIs that are useful for decision making in SN programs have been identified in literature. That list includes costs per revenue (e.g., food, labor, supply, equipment, other, and total), fund balance as a percent of revenue, breakfast and lunch participation rates (by grade and

school), meals per labor hour, costs per meal (food, labor, supply, equipment, other, and total), inventory on hand, and revenue per student. (Boettger, 2009; Council for Great City Schools [CGCS], 2012; and Cater et al., 2005).

School nutrition industry professionals suggest that effective utilization of KPIs requires specific characteristics of the individuals using the KPIs, as well as specific characteristics of the SN program where there KPIs are being utilized. The personal characteristics include an understanding of financial management and savvy business acumen. The program characteristics include operational systems for data gathering and analysis, and a compatible database of comparable statistics against which KPIs can be measured and benchmarked (Buzalaka, 2010).

Boettger (2009) suggests that SN professionals spend a considerable amount of time and resources collecting data, but less time and resources are spent analyzing this data to make wise decisions. Currently, there is a lack of research concerning SN professionals' usage or perceptions of KPIs as a tool to support SN program management.

Research Objectives

The purpose of this study was to explore SN directors' usage and perceptions of KPIs, and to identify the best format of a resource to support SN professionals' effective utilization of KPIs. The specific objectives were to determine the following:

- School nutrition directors' access to data for calculating KPIs;
- School nutrition directors' perceptions of KPIs;
- School nutrition directors' usage of KPIs;
- The relationship between SN directors' personal characteristics and usage/perceptions of KPIs;

- The relationship between SN program characteristics and usage/perceptions of KPIs; and
- The best format of a resource to support school nutrition professionals' effective utilization of KPIs.

METHODOLOGY

Research Plan

This project, which received approval from the Institutional Review Board at The University of Southern Mississippi prior to implementation, was conducted in four phases. In Phase I, the primary investigator visited a school nutrition (SN) program where the director had demonstrated success in utilizing key performance indicators (KPIs) for operational decision making. In Phase II, an expert panel of SN professionals experienced in applying KPIs was convened to discuss issues associated with utilizing KPIs in SN programs. The intent of Phase I and II of the study was to gather information to support the development of a national survey to meet the objectives of the study. In Phase III, a national survey was developed and validated with the assistance of a review panel of SN professionals. The survey was then mailed to a random sample of 700 SN directors representing the seven United States Department of Agriculture (USDA) regions. In Phase IV, a think tank consisting of eight SN professionals experienced in applying KPIs met to identify the best format of training resources to support school nutrition professionals' effective utilization of KPIs for operational decision making and program evaluation.

Phase I: Site Visit

Potential locations for Phase I were identified by contacting state agency child nutrition directors and asking for recommendations of SN directors who demonstrate excellence in utilizing KPIs for operational decision making. After receiving recommendations, an SN program director was selected and invited to participate via e-mail. The invitation included the following information: the purpose of the project, a description of the proposed site visit, the expected time commitment for the SN program and SN staff, and an informed consent document.

The first SN director who was invited agreed to participate in the site visit. The site visit consisted of structured interviews with the SN director and SN managerial staff, and a tour of the SN program to view routine operations. Prior to each structured interview, the researcher explained to participants the purpose of the study and defined the term “key performance indicator.” Interview participants were told that participation in the interview was completely voluntary and that they could decide to leave the interview at any time with no adverse consequences. During the structured interviews, the following information was gathered:

- What KPIs are used by various levels of SN staff members;
- The frequency KPIs are calculated;
- How KPIs are utilized;
- The strengths/advantages of using each KPI; and
- The barriers/disadvantages of using each KPI.

The tour of the SN operation included visits to several schools in the district to observe how and what data were captured for calculating KPIs.

Phase II: Expert Panel

Potential participants for the expert panel in Phase II were also identified by contacting state agency child nutrition directors. After receiving recommendations from state agency child nutrition directors, several SN program directors were sent e-mail invitations. The invitation explained the purpose of the project, and described what would be involved in this process, including the expected time commitment. Ten SN directors agreed to participate.

Prior to conducting the expert panel, discussion topics for the meeting were developed based on the site visit, the research objectives, and previous research. A listing of those discussion topics is provided in Figure 1 below. Approximately two weeks before the expert

panel meeting, participants were e-mailed a list of the first eight topics from Figure 1, and asked to consider their professional experiences based on these topics before attending the expert panel meeting.

Figure 1

Expert Panel Discussion Topics

1. When you hear the phrase “productivity measures” or “key performance indicators” (KPI) for making decisions and measuring operational success at SN programs, what things come to mind?
2. What is your level of understanding of financial reports, such as balance sheets and profit and loss (P&L) statements?
3. Regarding SN professionals (directors, district level management staff, and site-level managers) across the country, what do you consider as their level of understanding of financial reports, such as balance sheets and P&L statements?
4. How does an SN professional’s degree of understanding of these financial reports change based on school district size?
5. When/where did you gain an understanding of financial reports, such as balance sheets and P&L statements?
6. When/where should SN professionals become proficient in utilizing financial reports, such as balance sheets and P&L statements?
7. What specific financial reports do you and/or your staff analyze for measuring success and making decisions in SN programs?
8. What financial reports should SN professionals analyze for measuring success and making decisions in SN programs?
9. Within your school district, how are these reports generated/created (what position/what department, how often)? How long past the actual date of the data is the report generated?
10. What are the financial KPIs for measuring success and making decisions in your SN programs?
11. What are other non-financial KPIs for measuring success and making decisions in your SN programs?

(Figure 1 continues)

(Figure 1 continued)

Expert Panel Discussion Topics

12. For each financial and non-financial KPI discussed, please indicate the following:
 - a) What is the best way to calculate each KPI?
 - b) What factors should be considered when calculating and making decisions based on each KPI?
 - c) What is most SN professionals' exposure/knowledge of each KPI?
 - d) Which level of SN professional (directors, district level management staff, and site level managers) should be utilizing each KPI at a SN program?
 - e) What does your SN program do with the information gained from each KPI? What types of decisions are made based on each KPI?
 - f) How often is each KPI calculated at your SN program? How often should it be calculated? What type of trend analysis do you do with this data?
 - g) For which KPIs do you establish internal benchmarks? How do you determine the benchmark level for the KPI?
 - h) Are there any standard industry KPI benchmarks that you utilize?
 - i) What are the strengths or advantages of using each KPI?
 - j) What are the barriers or disadvantages of using each KPI?
 - k) How/when do you recommend that SN professionals (directors, district level management staff, and site level managers) receive training on how to calculate and utilize each KPI?

The expert panel session was conducted at the Institute of Child Nutrition, Applied Research Division (ICN, ARD) located on the campus of The University of Southern Mississippi in Hattiesburg, Mississippi. The agenda established for the expert panel was designed to address the issues outlined in the research objectives so that discussion supported the development of a survey to be utilized in Phase III of the study. Throughout the session, participants were asked

semi-structured, open-ended questions related to the research objectives. A structured approach was employed to keep the discussion focused on the selected topics. The expert panel was moderated by one researcher, while an additional researcher captured participant comments on a computer. Toward the end of the session, after all questions were discussed, the moderator summarized responses, and participants were asked to verify the accuracy of the depiction of the discussion summation. Afterwards, the responses recorded during the expert panel were incorporated into statements that were utilized to develop the quantitative survey instrument.

Phase III: National Survey Development and Administration

In Phase III of the study, themes identified from the qualitative data collected from the expert panel discussions were used to develop a survey instrument. The survey, *Key Performance Indicators for Measuring Productivity in School Nutrition Programs*, consisted of 105 multiple choice questions divided into the following two sections: “Your Opinion” and “Personal/Program Characteristics”.

The “Your Opinion” section of the survey contained nine sets of questions, which are described below. In several of these question sets, respondents were asked information concerning 11 standard SN KPIs including: Meals per Labor Hour, Cost as a Percent of Revenue, Cost per Meal, Revenue per Meal, Inventory Turnover Rate, Days of Inventory On-Hand, Average Daily Participation, Percent Over Production, Breakeven Point, Staff Turnover Rate, and Absentee Rate. In the first question set respondents were asked to rate their level of understanding of each SN KPI based on a three-point scale ranging from 1 (*no understanding*) to 3 (*adequate*). In the second question set, respondents were asked to indicate if they have access to the necessary data to calculate each SN KPI. In the third question set respondents were asked to indicate how often they calculate each SN KPI; the response choices ranged from daily to

never. The fourth question set asked respondents to indicate if they use each SN KPI for decision making. The fifth question set asked respondents to identify what level of SN professional in their district not including themselves, use KPIs; the choices ranged from district level supervisors to cooks. The sixth question set asked respondents to identify where they obtain the data for calculating each SN KPI; examples of response choices included the school cafeteria office and the state agency. The seventh question set asked respondents if they use benchmarks to evaluate each SN KPI. The eighth question set asked respondents to identify what level of SN professional in their district, not including themselves, have received training on KPIs; the choices ranged from district level supervisors to cooks. The ninth question set asked respondents to rate their level of agreement with 12 statements pertaining to the value and ease of use of SN KPIs. The four-point rating scale for the ninth question ranged from 4 (*strongly agree*) to 1 (*strongly disagree*).

The “Personal and Program Characteristics” section of the survey contained 21 questions. Examples of data gathered regarding personal characteristics included respondent’s position title, level of education, certification status, years of experience in their current position, and prior work experience. Examples of data gathered pertaining to SN program characteristics included: school district enrollment size, level of food processing (scratch vs. premade), level of disposable dishes vs. machine washables, location of the school district, percent of students approved for free and reduced-price meals, and percent average daily participation.

Review Panel

A group of 57 SN professionals were asked via e-mail to participate in a review panel to evaluate the draft survey. This group consisted of expert panel members and SN professionals who were referred by state agency child nutrition directors to participate in the expert panel.

The e-mail invitation contained instructions explaining the review process, and included the following attached documents: an informed consent form, a draft survey cover letter, a draft survey instrument, and an evaluation form. The instructions asked recipients to read each of the attached documents, complete the evaluation, and return the evaluation form via e-mail or fax within two weeks. The evaluation form contained 15 questions/statements to assess the readability, clarity, and flow of the survey cover letter and survey instrument. Additional space was provided on the evaluation form for reviewers to provide comments and suggestions to revise the cover letter, survey statements, and response categories. A reminder e-mail was sent to all recipients one week prior to the deadline. Return of the evaluation form served as consent to participate in the review process. Twenty-one (37%) evaluation forms were returned.

Revisions were made based upon comments and suggestions offered by the reviewers. The survey instrument used in this study was produced in a scannable form, using Magenta 5.0 Forms Designer software. This program creates scannable forms which allow participants to record their responses using a number two pencil. Surveys may then be scanned using Remark Classic OMR 2.5 software and directly transferred to a statistical program for analysis.

Survey Sample and Distribution

The study sample was selected from the database of school districts maintained by Market Data Retrieval, a company that specializes in the school market. A random sample of 700 SN directors representing the seven USDA regions was selected for the national survey administration.

The Total Design Method described by Dillman (1978) was used to distribute the surveys and increase the probability of survey returns. This method includes mailing potential respondents pre-notice letters that described the purpose of the study, explained how the data

will be collected and used, invited individuals to participate in the study, and informed them to expect the survey in the mail within one week. One week later, the survey packet consisting of a survey cover letter, survey instrument, and stamped, self-addressed, return envelope was sent to all potential respondents. The cover letter informed potential respondents about the purpose of the survey, consent information, the researcher's contact information for questions and concerns, and instructed respondents how to complete and return the survey in the packet. Two weeks after the survey packets were mailed, a reminder post card was sent to all potential respondents, encouraging them to complete and return the surveys. Returned, completed surveys served as consent for respondents' participation. No identifying codes were placed on the surveys, thus preserving the anonymity of all respondents.

Phase IV: Think Tank

Potential participants for the "think tank" in Phase IV were also identified from the list received from state agency child nutrition directors for the expert panel in Phase II. Several SN professionals were sent e-mail invitations that explained the purpose of the "think tank," and described what would be involved in this process, including the expected time commitment. Seven SN directors and one state agency child nutrition director agreed to participate. Prior to conducting the "think tank," an agenda with discussion topics was developed based on the objectives of the study and data collected in Phases I – III, and then e-mailed to participants. A sample of the agenda is provided in Figure 2 below.

Figure 2

Key Performance Indicator Think Tank Detailed Agenda with Discussion Topics

8:00 AM-8:15 AM: Participant Sign-In

8:10 AM-8:20 AM: Welcome

- Welcome
- Administrative business
- Participant introductions

8:20 AM-9:30 AM: Introductory Presentation

- Purpose of think tank
- Research leading up to this project

9:30 AM-10:30 AM: Large Group Activity 1:

1. Identify the target audience of a KPI resource
 - a. School district student enrollment size
 - b. Position level of SN professional
 - i. District level (director or manager)
 - ii. Unit/school level (supervisor or cook)
 - c. Individual’s experience level using KPIs
2. Based on the information provided thus far, identify what activities will the resource support?
 - a. Decision making
 - b. Evaluation
 - c. Benchmarking
 - d. Other
3. Based on the information provided thus far, identify how the resource will be utilized by _____ (target audience) to support _____ (activities above)?
 - a. What is it going to help the target audience do?
 - b. As a reference
 - c. As a training aid
 - d. As a self-assessment
 - e. As a workbook with examples

10:30 AM-10:45 AM: Break

10:45 AM-12:00 AM: Small Group Activity 1: (Based on the information provided thus far, identify major content area categories comeback together as large group and come to agreement/prioritize as needed)

1. Development of systems to capture, organize, and maintain KPI data
2. What KPIs should be included in the resource?
3. What information does each KPI provide?
4. How are KPIs calculated?
5. How should KPIs be interpreted?
6. What variables affect each KPI?
7. How should KPI data be used? (See activities identified by the group above.)

(Figure 2 continues)

(Figure 2 continued)

KPI Think Tank Detailed Agenda with Discussion Topics

12:00 AM-3:00 PM: Small Group Activity 2 and Working Lunch: (Based on the information provided thus far, identify the specific content area for each category comeback together as large group and come to agreement/prioritize as needed.)

1. Development of systems to capture, organize, and maintain KPI data
 - a. Capturing the data: Who, what, when, where how, and why
 - b. Organizing and maintaining the data: Who, what, when, where how, and why
2. What KPIs should be included in the resource:
 - a. Meals Per Labor Hour
 - b. Cost as a % of Revenue
 - c. Cost Per Meal
 - d. Revenue Per Meal
 - e. Inventory Turnover Rate
 - f. Days of Inventory On-Hand
 - g. Average Daily Participation
 - h. Percent Over-Production
 - i. Break Even Point
 - j. Staff Turnover Rate
 - k. Absentee Rate
 - l. Other
3. Information to include about each KPI:
 - a. Definition
 - b. What does each KPI indicate?
 - c. How do you calculate each KPI?
 - i. Examples
 - ii. Workbook problems
 - d. How do you to interpret each KPI?
 - e. What variables affect each KPI?
 - f. How do you to use KPI data? See activities identified by the group above
 - i. Decision making
 - ii. Evaluation
 - iii. Benchmarking
 - iv. Other

(Figure 2 continues)

(Figure 2 continued)

KPI Think Tank Detailed Agenda with Discussion Topics

3:00 PM-3:15 PM: Break:

3:15 PM -4:45 PM: Small Group Activity 3: (Based on the information provided thus far, identify the specific content area for each category comeback together as large group and come to agreement/prioritize as needed.)

4. Based on the information provided thus far, how should the resource be formatted and organized?
 - a. Sequence of content listed above
 - b. Organization of content areas above
 - c. Other information needed
 - i. Introduction
 - ii. Table of contents
 - iii. Index
 - iv. Glossary
5. Prioritize to be manageable b/c this is not a textbook: (if needed)
 - a. What goes in this resource
 - b. What goes in the next resource

4:45 PM-5:00 PM: Wrap up

The “think tank” was conducted at the ICN, ARD, located on the campus of The University of Southern Mississippi in Hattiesburg, Mississippi. As outlined in the agenda, “think tank” participants worked in small groups and collectively to identify the following issues associated with a KPI resource: the target audience, activities the resource will support, how the resource should be utilized, major content areas, specific content for each major area, and how the resource should be formatted and organized. The “think tank” was moderated by two researchers. Data for the “think tank” were captured on note cards and flip charts by either recorders designated in each small group activity or one of the researchers for the large group activities. Once the groups came to consensus on the data for agenda topics, the information was posted on the walls around the meeting room. Upon completion of the agenda topics, “think tank” participants were asked to review what had been posted on the walls and identify any gaps or duplications in the data provided.

Data Analysis

Survey data were analyzed using the statistical package SPSS Version 21.0 for Windows. Descriptive statistics included means, standard deviations, and frequencies of total responses. One-way ANOVA with Tukey's post hoc tests were conducted to determine the relationship between research variables.

RESULTS

The results of this study are presented in the following sequence: program characteristics, personal characteristics, access to calculating key performance indicators (KPIs), perceptions of KPIs, usage of KPIs, and the relationships between personal/program characteristics and usage/perceptions of KPIs. Program and personal characteristics are presented first to offer a description of the sample population.

Program Characteristics

The response rate for the survey was 29.3% (N=205). The school nutrition (SN) program characteristics of respondents are provided in Table 1. The largest percentages of respondents were from the Southeast (23.3%) and Southwest regions (18.0%), while the smallest percentages were from the Northeast (5.8%) and West (9.5%). Most respondents were from districts with student enrollments between 2,000 and 29,000 (65.0%). The most common purchasing methods were centralized (40.4%) or a combination of centralized and decentralized (38.9%), and the most common food production method was decentralized (food processed/prepared at individual school kitchens) (62.3%). The nutrition and feeding programs participated in by the majority of respondents were: The National School Lunch Program (100%), School Breakfast Program (97.1%), Summer Food Service Program (54.6%), and After School Snack Program (52.2%), while the programs with the lowest levels of participation by SN programs were Healthier School Day (2.4%), Supper Program (7.3%), and Child and Adult Care Feeding Program (16.6%). The vast majority of respondents indicated point-of-sale software is utilized at their SN program (92.9%).

Table 1

School Nutrition Program Characteristics

Question	Frequency^a	%
What USDA Region is your school district located?		
Southeast	44	23.3
Southwest	34	18.0
Mountain Plains	31	16.4
Mid-Atlantic	26	13.8
Mid-West	25	13.2
West	18	9.5
Northeast	11	5.8
What is the student enrollment in your school district?		
≤ 1,999	56	27.6
2,000-29,999	132	65.0
≥ 30,000 or greater	15	7.4
How is your SN program managed?		
Self-operated	182	91.0
Contract management company	18	9.0
Which purchasing method does your SN program use?		
Centralized (Foodservice orders to vendors are made at the district level.)	82	40.4
A combination of centralized and decentralized ordering	79	38.9
Decentralized (Foodservice orders to vendors are placed at the school level.)	42	20.7
Does your SN program have a central warehouse?		
No	119	58.9
Yes	83	41.1
Are the employees in your school district unionized?		
No	121	60.2
Yes	80	39.8

^aTotal N varies based on responses for each question^bTotal exceed 100% since respondents could select more than one response*(Table 1 continues)*

*(Table 1 continued)**School Nutrition Program Characteristics*

Question	Frequency^a	%
Which production method best describes your SN program?		
Food processed/prepared at individual school kitchens	127	62.3
A combination of centralized and decentralized food processing and preparation	66	32.3
Food processed/prepared at a central location(s) and distributed to satellite kitchens	11	5.4
Which production style best describes the SN program throughout your school district?		
Some food items prepared from scratch	162	79.0
Most food items prepared from scratch	30	14.6
No food items prepared from scratch	13	6.4
Which description best describes the SN program throughout your school district?		
A mixture of disposable trays and eating utensils and dishmachine warewashing	77	37.9
Mostly disposable trays and eating utensils	66	32.5
Mostly dishmachine warewashing	60	29.6
What percent of students are approved for free and reduced priced meals in your school district?		
0-19%	13	6.4
20-39%	37	18.2
40-59%	67	33.0
60-79%	59	29.1
≥ 80%	27	13.3
What is the percent average daily participation of students in the National School Lunch Program at your school or district?		
0-24%	2	1.0
25-49%	20	10.1
50-74%	110	55.6
≥ 75%	66	33.3

^aTotal N varies based on responses for each question^bTotal exceed 100% since respondents could select more than one response*(Table 1 continues)*

(Table 1 continued)

School Nutrition Program Characteristics

Question	Frequency^a	%
Which of the following programs does your school district participate in? (Select all that apply) ^b		
National School Lunch Program	205	100.0
School Breakfast Program	199	97.1
Summer Food Service Program	112	54.6
After School Snack Program	107	52.2
Farm to School	77	37.6
Fresh Fruit and Vegetable Program	70	34.1
HealthierUS School Challenge	51	24.9
Child and Adult Care Food Program	34	16.6
Supper Program	15	7.3
Healthier School Day	5	2.4
What method is used to conduct inventory at your school district?		
Periodic (take on a routine basis such as weekly, monthly, quarterly, annually)	114	57.6
Perpetual (inventory amount is updated continually as product are used)	13	6.6
Periodic and perpetual	70	35.3
None of the above	1	0.5
If you answered periodic to the above question, how often is inventory taken at your school district?		
Weekly	19	10.6
Monthly	117	65.4
Quarterly	7	3.9
Bi-annually	6	3.4
Annually	14	7.8
N/A	16	8.9
Do you use point-of-sale software in your school district?		
Yes	182	92.9
No	14	7.1

^aTotal N varies based on responses for each question^bTotal exceed 100% since respondents could select more than one response

Personal Characteristics

Table 2 provides a listing of the personal characteristics of survey respondents. The majority of respondents were SN directors (77.6%). Approximately 40% had an associate's degree or less as their highest level of education, while 27.4% had a bachelor's degree. The most common areas of study for those with a bachelor's degree or higher was nutrition and dietetics (21.5%), while the least common degree from the choices provided was culinary foodservice (3%). The majority of respondents indicated they were not certified (36.1%). The most common certification was School Nutrition Association Certified (27.3%), and the least common certification was American Culinary Federation Certified (1.0%). More than one third of respondents indicated that they had worked in SN programs for greater than 20 years (37.6%); however, the largest percentage of respondents indicated they had only been in their current position for 1 to 5 years (34.0%). When asked where they worked prior to taking their current position, less than half indicated they worked in a managerial role for an SN program (43.4%).

Table 2

Personal Characteristics of Respondents

Question	Frequency^a	%
What statement best describes your position?		
School nutrition director	153	77.6
District level school nutrition supervisor	34	17.3
School level school nutrition manager	10	5.1
What is your highest level of education?		
Less than a high school diploma or GED	1	0.5
High school diploma or GED	17	8.9
Some college credits	31	16.3
Associate's degree	28	14.7
Bachelor's degree	52	27.4
Some graduate credits	8	4.2
Master's degree	30	15.8
Graduate hours beyond master's degree	14	7.4
Doctoral degree	9	4.8
If you have a Bachelor's degree or higher, what was your primary area of study? (Please check all that apply.) ^b		
Nutrition/dietetics	44	21.5
Other	34	16.6
Foodservice management	27	13.2
Business	27	13.2
Food and nutrition	25	12.2
Hospitality management	9	4.4
Culinary foodservice	7	3.4
What is your certification/credentialed status? (Select all that apply.) ^b		
Not certified	74	36.1
School Nutrition Association Certified	56	27.3
School Nutrition Specialist Credential	43	21.0
Registered Dietitian	31	15.1
State Department of Education Certified	28	13.7
Licensed Dietitian/Nutritionist	15	7.3
American Culinary Federation Certified	2	1.0

^aTotal N varies based on responses for each question^bTotal exceed 100% since respondents could select more than one response*(Table 2 continues)*

*(Table 2 continued)**Personal Characteristics of Respondents*

Question	Frequency^a	%
How many years have you worked in SN programs?		
1 to 5 years	32	16.1
6 to 10 years	39	19.6
11 to 15 years	27	13.6
16 to 20 years	26	13.1
Greater than 20 years	75	37.6
How long have you been in your current position?		
1 to 5 years	66	34.0
6 to 10 years	47	24.2
11 to 15 years	35	18.0
16 to 20 years	18	9.3
Greater than 20 years	28	14.5
Prior to taking your current position, did you work as a? (Please select all that apply.) ^b		
Other	91	44.4
District level SN director in a smaller district	30	14.6
Restaurant manager	26	12.7
Healthcare foodservice director/ manager	23	11.2
District level SN supervisor in larger district	15	7.3
School teacher	15	7.3
School level SN manager in a larger district	13	6.3
District level SN supervisor in smaller district	12	5.9
State agency staff	11	5.4
School level SN manager in a smaller district	10	4.9
District level SN director in a larger district	9	4.4

^aTotal N varies based on responses for each question^bTotal exceed 100% since respondents could select more than one response**Access to Calculating Key Performance Indicators**

The data presented below concerns SN directors' access to data for calculating SN KPIs.

The two areas addressed are general access and where data is obtained.

General Access

When respondents were asked if they have the necessary data to calculate each SN KPI, the majority said “Yes” (Table 3). Average Daily Participation, Cost per Meal, and Meals per Labor Hour were the KPIs that received the most responses of “Yes” (98.0%, 94.0%, and 93.6%, respectively). Percent Over-Production, Inventory Turnover Rate, Breakeven Point, and Days Inventory On-Hand were the KPIs that received the most responses of “No” (14.9%, 13.9%, 12.9%, and 12.9%, respectively) and “I do not know” (18.3%, 9.5%, 8.4%, and 7.9%, respectively).

Table 3

“Do You Have Access to the Necessary Data to Calculate Key Performance Indicators?”

	Yes (n / %)	No (n / %)	I do not know (n / %)
Average Daily Participation	198 / 98.0	3 / 1.5	1 / 0.5
Cost Per Meal	189 / 94.0	9 / 4.5	3 / 1.5
Meals Per Labor Hour	190 / 93.6	7 / 3.4	6 / 3.0
Revenue Per Meal	184 / 89.8	13 / 6.3	8 / 3.9
Staff Turnover Rate	170 / 83.7	21 / 10.3	12 / 5.9
Cost as a Percent of Revenue	168 / 82.4	26 / 12.7	10 / 4.9
Absentee Rate	162 / 81.8	25 / 12.6	11 / 5.6
Days of Inventory On-Hand	160 / 79.2	26 / 12.9	16 / 7.9
Breakeven Point	159 / 78.7	26 / 12.9	17 / 8.4
Inventory Turnover Rate	154 / 76.6	28 / 13.9	19 / 9.5
Percent Over-Production	135 / 66.8	30 / 14.9	37 / 18.3

n = Frequency of responses
% = Percent of responses

Where Data is Obtained

When respondents were asked to identify all the places where data is obtained for calculating each SN KPI, the most frequently selected location for all but one SN KPI (percent over production) was the district SN office (Table 4). The largest percentage of respondents indicated that Percent Over-Production was not calculated (44.4%).

Table 4

*Where Data is Obtained for Calculating Key Performance Indicators**

KPIs	School Cafeteria Office (n/%)	School Principal's Office (n/%)	District School Nutrition Office (n/%)	District Business / Accounting Office (n/%)	State Agency (n/%)	This Data is Not Received (n/%)	This KPI is Not Calculated (n/%)
Meals Per Labor Hour	55/26.8%	1/0.5%	151/73.7%	18/8.8%	8/3.9%	4/2.0%	16/7.8%
Cost as a Percent of Revenue	26/12.7%	0/0.0%	114/55.6%	42/20.5%	4/2.0%	8/3.9%	46/22.4%
Cost Per Meal	52/25.4%	0/0.0%	146/71.2%	24/11.7%	11/5.4%	1/0.5%	14/6.8%
Revenue Per Meal	39/19.0%	2/1.0%	121/59.0%	33/16.1%	6/2.9%	4/2.0%	35/17.1%
Inventory Turnover Rate	47/22.9%	0/0.0%	91/44.4%	7/3.4%	1/0.5%	11/5.4%	76/37.1%
Days of Inventory On-Hand	56/27.3%	0/0.0%	93/45.4%	6/2.9%	1/0.5%	10/4.9%	69/33.7%
Average Daily Participation	66/32.2%	11/5.4%	140/68.3%	17/8.3%	7/3.4%	2/1.0%	5/2.4%
Percent Over-Production	43/21.0%	0/0.0%	63/30.7%	11/5.4%	1/0.5%	15/7.3%	91/44.4%
Breakeven Point	24/11.7%	1/0.5%	96/46.8%	32/15.6%	4/2.0%	11/5.4%	61/29.8%
Staff Turnover Rate	26/12.7%	2/1.0%	86/42.0%	29/14.1%	1/0.5%	9/4.4%	75/36.6%
Absentee Rate	31/15.1%	8/3.9%	81/39.5%	30/14.6%	1/0.5%	10/4.9%	72/35.1%

* Respondents were instructed to select all choices that applied to their school district

n = Frequency of responses

% = Percent of responses

Perceptions of Key Performance Indicators

Various topics pertaining to SN directors' perceptions of KPIs are addressed in this section. Those topics include: SN directors' perceived understanding of KPIs, and SN directors' perceptions of KPIs concerning value, ease of use and training.

Understanding of Key Performance Indicators

When respondents were asked to rate the level of understanding of SN KPIs on a three point scale (3=adequate, 2=partial, and 1=no understanding), the KPIs that received the highest mean ratings were Average Daily Participation (2.95 ± 0.27), Meals Per Labor Hour (2.87 ± 0.38) and Cost Per Meal (2.84 ± 0.41). The KPIs that received the lowest mean ratings were Percent Over-Production (2.25 ± 0.76), Inventory Turnover Rate (2.54 ± 0.63), and Days of Inventory On-Hand (2.58 ± 0.62). (Table 5.) Note that all of these means are between “partial” and “adequate” rating.

Table 5

Mean Rating for Level of Understanding of Key Performance Indicators

	Mean^a	SD^b
Average Daily Participation	2.95	0.27
Meals Per Labor Hour	2.87	0.38
Cost Per Meal	2.84	0.41
Revenue Per Meal	2.75	0.47
Absentee Rate	2.69	0.54
Staff Turnover Rate	2.67	0.58
Cost as a Percent of Revenue	2.66	0.58
Break Even Point	2.65	0.58
Day of Inventory On-Hand	2.58	0.62
Inventory Turnover Rate	2.54	0.63
Percent Over-Production	2.25	0.76

^a Three-point rating scale: adequate=3, partial=2, and no understanding=1

^b Standard deviations for each mean

When the frequencies and percentages for respondents' level of understanding of SN KPIs were tallied, three issues became apparent (Table 6). First, the majority of respondents indicated they had an adequate understanding of 11 of the 12 SN KPIs. Second, Percent Over-Production was the only KPI where less than half of respondents (44.6%) indicated they had an adequate understanding. Third, 19.3% of respondents indicated they had no level of understanding of the KPI Percent Over-Production. (Table 6.)

Table 6

Level of Understanding of Key Performance Indicators

	Adequate (n / %)	Partial (n / %)	No Understanding (n / %)
Average Daily Participation	195 / 95.6	7 / 3.4	2 / 1.0
Meals per Labor Hour	178 / 88.1	21 / 10.4	3 / 1.5
Cost Per Meal	173 / 85.2	27 / 13.3	3 / 1.5
Revenue Per Meal	156 / 76.5	45 / 22.1	3 / 1.5
Staff Turnover Rate	149 / 73.0	43 / 21.1	12 / 5.9
Absentee Rate	147 / 72.8	47 / 23.3	8 / 4.0
Cost as a Percent of Revenue	145 / 71.1	48 / 23.5	11 / 5.4
Breakeven Point	142 / 70.3	49 / 24.3	11 / 5.4
Days of Inventory On-Hand	132 / 65.3	56 / 27.7	14 / 6.9
Inventory Turnover Rate	123 / 61.2	63 / 31.3	15 / 7.5
Percent Over-Production	90 / 44.6	73 / 36.1	39 / 19.3

n = Frequency of responses

% = Percent of responses

Value, Ease of Use, and Training

Respondents were asked to rate their level of agreement with several statements associated with the value, ease of use, and training of SN KPIs. The four point rating scale ranged from 4 (*strongly agree*) to 1 (*strongly disagree*). These are provided in Table 7 in descending order based on the combined frequencies/percentages of strongly agree and agree ratings given. As demonstrated by the results in Table 7, the overwhelming majority of respondents agreed or strongly agreed that KPIs are a valuable SN managerial tool: “Key Performance Indicators, when calculated correctly, can provide essential information about the SN program” (95.5%); “Key Performance Indicators are useful for decision making” (94.5%); and “Key performance indicators are valuable tools for evaluating an SN program” (92.0%). However, most agreed or strongly agreed that many SN professionals do not understand the value of KPIs (72.9%).

With regard to ease of use, SN directors’ perceptions of KPIs were mixed. While the majority of respondents agreed or strongly agreed that decisions based on incorrectly interpreted KPIs can have negative consequences (88.5%); directors’ perceptions were more distributed on the other statements in this topic area. For example, 54.5% agreed that KPIs are time consuming to calculate, while 19.7% disagreed; 50% agreed that KPIs were easy to calculate, while 25.0% disagreed; 51.5% agreed that data for calculating KPIs is easy to obtain, while, 31.8% disagreed; 50.2% disagreed that KPIs are difficult to interpret, while 30.3% agreed; and 52.3% disagreed that there is no uniform process for calculating KPIs, while 28.1% agreed.

The SN directors’ perceptions suggest the need for more KPI training. When respondents were asked to rate their level of agreement with the statement “School nutrition professionals receive adequate training on KPIs,” 81.6% disagreed or strongly disagreed (Table 7).

Additionally, the majority of respondents reported that cooks, school level managers, and district level supervisors, either do not receive training on KPIs, or they did know if individuals in these positions receive KPI training (91.0% , 60.0% , and 53.0%, respectively (Table 8.).

Table 7

Frequencies and Percentages of Agreement Ratings Regarding Statements about Key Performance Indicators

	Strongly Agree (n/%)	Agree (n/%)	Disagree (n/%)	Strongly Disagree (n/%)	N/A (n/%)
KPIs when calculated correctly can provide essential information about the SN program.	88/44.2	102/51.3	0/0.0	0/0.0	9/4.5
KPIs are useful for decision making.	72/36.2	116/58.3	4/2.0	0/0.0	7/3.5
KPIs are valuable tools for evaluating an SN program.	67/33.5	117/58.5	5/2.5	2/1.0	9/4.5
Decisions based on incorrectly interpreted KPIs can have negative consequences.	35/17.6	141/70.9	10/5.0	2/1.0	11/5.5
Many SN professionals do not understand the value of KPIs.	44/22.1	101/50.8	35/17.6	4/2.0	15/7.5
KPIs are time consuming to calculate.	34/17.2	108/54.5	39/19.7	8/4.0	9/4.5
KPIs are easy to calculate.	34/17.0	100/50.0	50/25.0	6/3.0	10/0.5
Data for calculating KPIs is easy to obtain.	14/7.1	102/51.5	63/31.8	10/5.1	9/4.5
KPIs are difficult to interpret.	7/3.5	61/30.3	101/50.2	22/10.9	10/0.5
There is no uniform process for calculating KPIs.	9/4.5	56/28.1	104/52.3	16/0.8	14/7.0
School nutrition professionals receive adequate training on KPIs.	6/3.0	21/10.4	94/46.8	70/34.8	10/5.0

n = Frequency of responses

% = Percent of responses

Table 8

The Level of School Nutrition Professionals that Have Received Training on Key Performance Indicators at School Districts

	Yes (n / %)	No (n / %)	I do not know (n / %)
District Level Supervisors	93/47.0%	77/38.9%	28/14.1%
School Level Managers	80/40.0%	100/50.0%	20/10.0%
Cooks	18/9.0%	168/84.0%	14/7.0%

n = Frequency of responses
% = Percent of responses

Usage of Key Performance Indicators

Frequency

When respondents were asked to identify how often they calculated each SN KPI, the most common frequency reported for calculating average daily participation, meals per labor hour, cost as a percent of revenue, and revenue per meal was monthly (53.0%, 35.6%, 34.5%, and 30.7%, respectively). The most common frequency reported for calculating cost per meal was annually (33.5%), followed closely by monthly (32.5%). The majority of respondents reported they never calculate percent over-production, staff turnover rate, and inventory turnover rate (58.6%, 53.4%, and 50.2%, respectively) (Table 9).

Table 9

Frequency Key Performance Indicators are Calculated

	Daily (n/%)	Weekly (n/%)	Monthly (n/%)	Quarterly (n/%)	Annually (n/%)	Never (n/%)
Average Daily Participation	50/24.8%	16/7.9%	107/53.0%	15/7.4%	6/3.0%	8/4.0%
Meals Per Labor Hour	6/2.9%	14/6.8%	73/35.6%	33/16.1%	60/29.3%	19/9.3%
Cost as a Percent of Revenue	1/0.5%	7/3.4%	70/34.5%	21/10.3%	50/24.6%	54/26.6%
Revenue Per Meal	6/2.9%	12/5.9%	63/30.7%	25/12.2%	51/24.9%	48/23.4%
Cost Per Meal	8/3.9%	12/5.9%	66/32.5%	33/16.3%	68/33.5%	16/7.9%
Breakeven Point	3/1.5%	7/3.5%	48/23.9%	21/10.4%	55/27.4%	67/33.3%
Days of Inventory On-Hand	7/3.4%	18/8.9%	56/27.6%	15/7.4%	18/8.9%	89/43.8%
Absentee Rate	10/4.9%	8/3.9%	35/17.2%	14/6.9%	42/20.6%	95/46.6%
Inventory Turnover Rate	1/0.5%	13/6.3%	44/21.5%	21/10.2%	23/11.2%	103/50.2%
Staff Turnover Rate	4/2.0%	3/1.5%	9/4.4%	14/6.9%	65/31.9%	109/53.4%
Percent Over-Production	13/6.4%	11/5.4%	28/13.8%	16/7.9%	16/7.9%	119/58.6%

n = Frequency of responses

% = Percent of responses

Decision Making

The KPIs most respondents said they utilized for decision making were average daily participation (91.2%), cost per meal (88.7%), meals per labor hour (82.0%), revenue per meal (63.5%), cost as a percent of revenue (60.6%), and breakeven point (52.5%). The KPIs used the least for decision making were staff turnover rate (29.6%), percent over-production (32.5%), and inventory turnover rate (35.6%) (Table 10).

Table 10

*Use of Key Performance Indicators to Make Decisions**

	n	%
Average Daily Participation	186	91.2%
Cost Per Meal	180	88.7%
Meals Per Labor Hour	168	82.0%
Revenue Per Meal	129	63.5%
Cost as a Percent of Revenue	123	60.6%
Breakeven Point	106	52.5%
Days of Inventory On-Hand	90	44.3%
Absentee Rate	86	42.2%
Inventory Turnover Rate	72	35.6%
Percent Over-Production	66	32.5%
Staff Turnover Rate	60	29.6%

* This survey question asked respondents "Do you use KPIs to make decisions?" The answer choices were "Yes" and No."

n = Frequency of respondents that answered "Yes."

% = Percent of respondents that answered "Yes."

Level of School Nutrition Professional

When respondents were asked to indicate what level of SN professionals other than themselves in their school district use SN KPIs, the majority said district level supervisors (57.2%). The largest percentage of respondents reported that cooks and school level managers do not use SN KPIs (78.9% and 47.3%, respectively) (Table 11).

Table 11

The Level of School Nutrition Professional that Uses Key Performance Indicators in School Districts

	Yes (n/%)	No (n/%)	I do not know (n/%)
District Level Supervisors	115/57.2%	60/29.9%	26/12.9%
School Level Managers	87/42.9%	96/47.3%	20/9.9%
Cooks	30/15.1%	157/78.9%	12/6/0%

n = Frequency of responses

Use of Comparative Data

When respondents were asked if they use comparative data such as benchmarks to evaluate KPIs, most responded “yes” for the following KPIs: meals per labor hour (72.5%), average daily participation (69.2%), and cost per meal (68.7%). The KPIs that the majority of respondents do not evaluate with comparative data were percent over-production (67.5%), inventory turnover rate (66.3%), staff turnover rate (63.2%), days of inventory on-hand (61.2%), absentee rate (59.3%), and breakeven point (53.6%) (Table 12).

Table 12

Use of Comparative Data, Such as Benchmarks, to Evaluate Key Performance Indicators

	Yes (n/%)	No (n/%)	I do not know (n/%)
Meals Per Labor Hour	148/72.5%	40/19.6%	16/7.8%
Average Daily Participation	139/69.2%	50/24.9%	12/6.0%
Cost Per Meal	138/68.7%	49/24.4%	14/7.0%
Revenue Per Meal	98/48.5%	88/43.6%	16/7.9%
Cost as a Percent of Revenue	90/45.0%	90/45.0%	20/10.0%
Breakeven Point	70/35.7%	105/53.6%	21/10.7%
Days of Inventory On-Hand	58/28.9%	123/61.2%	20/10.0%
Absentee Rate	55/27.6%	118/59.3%	26/13.1%
Staff Turnover Rate	51/25.4%	127/63.2%	23/11.4%
Inventory Turnover Rate	47/23.3%	134/66.3%	21/10.4%
Percent Over-Production	38/18.7%	137/67.5%	28/13.8%

n = Frequency of responses

% = Percent of responses

Relationships Between Program/Personal Characteristics and Perceptions/Usage of Key Performance Indicators

In the section below, the findings that are presented include the relationship between district enrollment size and respondents' perceptions of KPIs associated with understanding, value and ease of use. No significant findings were observed between any other program/personal characteristics and access to or usage of KPIs; therefore, no further details regarding the relationship between these variables are presented.

Enrollment and Perceived Understanding of Key Performance Indicators

One-way ANOVA and Tukey's post hoc comparisons demonstrated a significant relationship between district enrollment and respondents' perceived understanding of four KPIs (Table 13). As school district enrollment size increased from $\leq 1,999$ to 2,000-29,999, respondents' perceived level of understanding of meals per labor hour and breakeven point significantly increased ($p < 0.05$ and $p < 0.05$, respectively); however, no significant differences were observed for the same KPIs between districts with enrollment of $\leq 1,999$ and districts with enrollment of $\geq 30,000$ or between districts with enrollments of 2,000-29,999 and $\geq 30,000$. Additionally, it was observed that respondents' perceived level of understanding of cost as a percentage of revenue and revenue per meal significantly increased as school district size increased from $\leq 1,999$ to 2,000-29,999 ($p < 0.05$ and $p < 0.05$; respectively) and from $\leq 1,999$ to $\geq 30,999$ ($p < 0.05$ and $p < 0.05$; respectively). (Table 13)

Table 13

Enrollment Compared to Respondents' Understanding of Key Performance Indicators

KPIs	Enrollment	n	Mean^g	SD
Meals per Labor Hour	≤ 1,999 ^a	54	2.69	0.58
	2,000 – 29,999 ^a	131	2.93	0.25
	≥ 30,000	15	2.93	0.26
Cost as a Percentage of Revenue	≤ 1,999 ^{bc}	55	2.42	0.69
	2,000 – 29,999 ^b	132	2.74	0.50
	≥ 30,000 ^c	15	2.87	0.35
Revenue per Meal	≤ 1,999 ^{de}	55	2.60	0.60
	2,000 – 29,999 ^d	132	2.80	0.41
	≥ 30,000 ^e	15	2.93	0.26
Break Even Point	≤ 1,999 ^f	54	2.43	0.72
	2,000 – 29,999 ^f	131	2.73	0.49
	≥ 30,000	15	2.80	0.41

^a F(2, 197) = 8.74, p = .001 Comparison of enrollment to Respondents' Understanding of KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{bc} F(2, 199) = 7.83, p = .001 Comparison of enrollment to Respondents' Understanding of KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{de} F(2, 199) = 4.81, p = .009 Comparison of enrollment to Respondents' Understanding of KPIs using one-way ANOVA and Tukey's post hoc comparisons

^f F(2, 197) = 6.34, p = .002 Comparison of enrollment to Respondents' Understanding of KPIs using one-way ANOVA and Tukey's post hoc comparisons

^g The rating scale for level of understanding was a 3-point (3=adequate understanding, 2=partial understanding, 1=no understanding).

Enrollment and Perceived Ease of Use/Value of Key Performance Indicators

Two trends pertaining to enrollment and perceived ease of use of KPIs were exposed using one-way ANOVA testing (Table 14). First, as district enrollment increased from ≤ 1,999 to 2,000-29,999 and from ≤ 1,999 to ≥ 30,000, respondents' agreement ratings with the following statements significantly increased: KPIs are easy to calculate; data for calculating KPIs is easy to obtain; and decisions based on incorrectly interpreted KPIs can have negative consequences (p<0.05; p<0.05, and p<0.05; for each respectively). Second, as enrollment size increased from

$\leq 1,999$ to 2,000-29,999, respondents' level of agreement with the following two statements significantly increased: KPIs are difficult to interpret and KPIs are time consuming to calculate ($p < 0.05$ for each). However, no significant differences were observed between respondents with enrollments of $\leq 1,999$ to $\geq 30,000$ regarding these two statements.

One-way ANOVA testing suggested a significant relationship ($p < 0.05$) between enrollment and perceived value of KPIs (Table 14). As district enrollment increased from $\leq 1,999$ to 2,000-29,999 and from $\leq 1,999$ to $\geq 30,000$, respondents' level of agreement with the following statements significantly increased: when calculated correctly, KPIs can provide essential information about a SN program; many SN professionals do not understand the value of KPIs; KPIs are valuable tool for evaluating a SN program; and KPIs are useful for decision making. However, no significant differences were observed between respondents with enrollments from 2,000-29,999 to $\geq 30,000$ regarding these statements.

Table 14

Enrollment Compared to Agreement with Statements Regarding Ease of Use and Value of Key Performance Indicators

KPIs	Enrollment	n	Mean^q	SD
KPIs are easy to calculate.	≤ 1,999 ^{ab}	54	2.37	1.22
	2,000 – 29,999 ^a	131	2.80	0.82
	≥ 30,000 ^{ab}	15	3.13	0.64
Data for calculating KPIs is easy to obtain.	≤ 1,999 ^{cd}	54	2.20	1.09
	2,000 – 29,888 ^c	129	2.60	0.77
	≥ 30,000 ^d	15	2.93	0.59
Decisions based on incorrectly interpreted KPIs can have negative consequences.	≤ 1,999 ^{ef}	53	2.51	1.31
	2,000 – 29,999 ^c	131	3.09	0.60
	≥ 30,000 ^f	15	3.13	0.35
KPIs, when calculated correctly, can provide essential information about an SN program.	≤ 1,999 ^{gh}	53	2.79	1.26
	2,000 – 29,999 ^g	131	3.47	0.58
	≥ 30,000 ^h	15	3.67	0.49
Many SN professionals do not understand the value of KPIs.	≤ 1,999 ^{ij}	53	2.40	1.31
	2,000 – 29,999 ⁱ	132	2.90	0.92
	≥ 30,000 ^j	14	3.07	0.83

^{ab} F(2, 197) = 5.76, p = .004 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{cd} F(2, 195) = 5.96, p = .003 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{ef} F(2, 195) = 9.52, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{gh} F(2, 196) = 14.69, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{ij} F(2, 196) = 5.12, p = .007 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{kl} F(2, 197) = 13.49, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{mn} F(2, 196) = 13.03, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^o F(2, 198) = 3.61, p = .029 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^p F(2, 195) = 4.12, p = .018 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^q The agreement scale contained four points 4=strongly agree, 2=agree, 3=disagree, and 4=strongly disagree).

(Table 14 continues)

Table 14 continued

Enrollment Compared to Agreement with Statements Regarding Ease of Use and Value of Key Performance Indicators

KPIs	Enrollment	n	Mean^q	SD
KPIs are valuable tools for evaluating an SN program.	≤ 1,999 ^{kl}	54	2.67	1.26
	2,000 – 29,999 ^k	131	3.31	0.62
	≥ 30,000 ^l	15	3.60	0.51
KPIs are useful for decision making.	≤ 1,999 ^{mn}	53	2.81	1.13
	2,000 – 29,999 ^m	131	3.35	0.58
	≥ 30,000 ⁿ	15	3.73	0.46
KPIs are difficult to interpret.	≤ 1,999 ^o	54	1.91	1.09
	2,000 – 29,999 ^o	132	2.27	0.70
	≥ 30,000	15	2.13	0.10
KPIs are time consuming to calculate.	≤ 1,999 ^p	53	2.47	1.20
	2,000 – 29,999 ^p	130	2.89	0.75
	≥ 30,000	15	2.60	0.83

^{ab} F(2, 197) = 5.76, p = .004 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{cd} F(2, 195) = 5.96, p = .003 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{ef} F(2, 195) = 9.52, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{gh} F(2, 196) = 14.69, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{ij} F(2, 196) = 5.12, p = .007 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{kl} F(2, 197) = 13.49, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^{mn} F(2, 196) = 13.03, p = .001 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^o F(2, 198) = 3.61, p = .029 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^p F(2, 195) = 4.12, p = .018 Comparison of enrollment to respondents' Agreement regarding statements about KPIs using one-way ANOVA and Tukey's post hoc comparisons

^qThe agreement scale contained four points 4=strongly agree, 2=agree, 3=disagree, and 4=strongly disagree).

Think Tank Results

When presented with the survey results, “think tank” participants recommended that the target audience for the resource should be unit and district level SN managerial staff at all school districts, regardless of district size. Three primary uses of the resource were identified: an operational guide, a communication tool, and a staff development instrument. As an operation guide, the resource could be used to support SN program planning and decision making and evaluate the progress and effectiveness of those plans and decisions. As a communication tool, the resource could be used to present numerical data to school administration to provide evidence to support the implementation of new initiatives or promote the effectiveness of current initiatives. As a staff development instrument, the resource could be used in a couple of ways. For example, the resource could be used to train SN staff on data based program planning, decision making, and evaluation. Additionally, the resource could be used to set measurable and objective staff goals and evaluate the progress of those goals as part of the routine staff development process. It was further decided that the resource should contain a “quick” reference section with formulas for calculating each KPI. The title identified for the resource was “Child Nutrition Guide to Key Performance Indicators.” It was recommended that the resource contain the following nine sections: Table of Contents, Introduction, Key Terms, Key Performance Indicators, Systems for Collecting and Organizing KPI Data, Continuous Improvement Model for Using KPIs, Case studies using KPIs, Appendices, and Index. A description of what should be included in each section of the resource is provided in Figure 3.

Figure 3

Organization of the “Child Nutrition Guide to Key Performance Indicators”

1. Table of Contents
2. Introduction
 - a. Definition of key performance indicators (KPIs)
 - b. Purpose of the guide
 - c. What’s in it for me? (Benefits associated with using the resource)
 - d. How to use the guide
3. Key Terms
4. Key Performance Indicators
 - a. Introduction (an explanation of what is in the section and how it is organized)
 - b. The KPIs included in this section:
 - i. Average Daily Participation
 - ii. Food Sales
 1. Student meals
 2. Adult meals
 3. Other food sales
 - iii. Costs / Expenditures
 1. Labor
 2. Food
 3. Supplies
 4. Capital equipment
 5. Indirect costs
 - iv. Cost per meal
 - v. Menu cost
 - vi. Cost as a percent of revenue
 - vii. Meals per labor hour
 - viii. Staff turnover rate
 - ix. Absentee rate
 - x. Days inventory on hand
 - xi. Percent over production
 - xii. Breakeven point

(Figure 3 continues)

(Figure 3 continued)

Organization of the “Child Nutrition Guide to Key Performance Indicators”

- c. Information pertaining to or included under each KPI:
 - i. Each KPI section should be no more than four pages
 - ii. Definition of the KPI
 - iii. What the KPI indicates
 - iv. How the KPI can be used
 - 1. Evaluation
 - 2. Planning
 - 3. Decision making
 - 4. Training
 - 5. Communication/marketing
 - 6. Broken down by the following: district level, site/unit level, student grade level, meal, eligibility status of students, and other
 - v. How often should the KPI be calculated
 - vi. Information needed to calculate the KPI
 - vii. Source of information for calculating the KPI
 - viii. How to calculate the KPI with sample calculation
 - ix. Factors (controllable and uncontrollable) that influence/affect the KPI
- 5. Systems for Collecting and Organizing KPI Data
 - a. Organize by information source
 - i. Revenue/income
 - ii. Expenditure/cost
 - iii. Participation
 - iv. Inventory Value
 - v. Labor hours
 - vi. Miscellaneous
 - b. Define information source
 - c. Where/how to store
 - d. Bench Marking (templates and examples)
 - e. Trend analysis (templates and examples)
 - f. District resources
- 6. Continuous Improvement Model for Using KPIs
 - a. Program evaluation
 - b. Program planning
 - c. Decision making
- 7. Case studies using KPIs
- 8. Appendices
 - a. Quick reference guide for KPI formulas
 - b. Reproducible worksheets for calculating KPIs
 - c. A checklist identifying all cost associated for child nutrition programs
 - d. A sample profit and loss statement with explanations
- 9. Index

CONCLUSIONS

The findings of this study suggest that school nutrition (SN) directors' overall access to data for calculating key performance indicators (KPIs) is good. Most SN directors believe they have access to the necessary data to calculate SN KPIs, especially average daily participation, cost per meal, and meals per labor hour. Further, most directors do not have to go outside their own departments to gather KPI data, because this data is usually captured in the district SN office.

This study reveals some consensus among SN directors' regarding their perceptions of KPIs. For this study, perceptions of KPIs were categorized as follows: understanding, value, ease of use and training. With the exception of percent over-production, most SN directors perceive they have an adequate understanding of each of the SN KPIs. The vast majority of SN directors perceive that SN KPIs provide essential information about SN programs and that they are valuable managerial tools for activities such as program evaluation and decision making. However, most of the respondents believe KPIs are undervalued by SN professionals, and most are concerned that decisions based on incorrectly interpreted KPIs can have negative consequences for an SN program. There is little consensus among SN directors regarding the ease of use of KPIs, specifically with regard to the following statements: KPIs are time consuming to calculate, KPIs are easy to calculate, data for calculating KPIs is easy to obtain, KPIs are difficult to interpret, and there is no uniform process for calculating KPIs. The vast majority of SN directors do not believe SN professionals receive adequate, if any, training on KPIs.

The findings of this study illustrate some common patterns with regard to KPI usage. Average daily participation, meals per labor hour, cost as a percent of revenue, revenue per meal,

and cost per meal are the KPIs calculated with the greatest frequency, usually monthly. Not surprisingly, these KPIs along with breakeven point are the KPIs most commonly used for decision making. Conversely, most SN directors do not calculate inventory turnover rate, staff turnover rate, and percent over-production, and these KPIs are the least frequently used for decision making. The only KPIs that the majority of SN directors evaluate with comparative data, such as benchmarks, are meals per labor hour, average daily participation, and cost per meal. Aside from SN directors, most district level supervisors use KPIs; however, most school level managers and cooks do not.

This study also illustrates some common patterns between usage of KPIs and SN directors' access to and understanding of KPIs. Average daily participation, meals per labor hour and cost per meal are the KPIs with which SN directors have the greatest amount of understanding and the greatest access to data for calculating, and these are the KPIs most often used for decision making and benchmarking. Conversely, percent over-production and inventory turnover rate are the KPIs for which SN directors have the least amount of understanding, and these are the KPIs least frequently used for decision making or benchmarking.

The results of this study suggest that there is a significant relationship between district enrollment and SN directors' perceptions of KPIs related to understanding, value, and ease of use. To simplify this explanation, district enrollment ranges are categorized as follows: small = $\leq 1,999$, medium = 2,000-29,999, and large = $\geq 30,000$. School nutrition directors from medium districts are more likely than those from small districts to report an adequate understanding of two KPIs (meal per labor hour and breakeven point); while directors from medium and large districts are more likely than those from small districts to report an adequate understanding of two other KPIs (cost as a percentage of revenue and revenue per meal). It is

unclear why district enrollment size only affects SN directors' understanding of these select KPIs.

School nutrition directors from medium and large districts are more likely to perceive the process of capturing KPIs data and calculating KPIs as easy compared to directors from small districts. Further, SN directors from medium and large districts are more likely to realize and appreciate the consequences of negatively interpreted KPIs and more likely to place a higher value on KPIs compared to directors from small districts. This may indicate that SN directors from medium and large size schools districts have more experience and training related to the utilization of KPIs. However, SN directors from medium size school districts are more likely to perceive that KPIs are time consuming to calculate and difficult to interpret, compared to SN directors from small districts. The possible reasons for this are not as clear. School nutrition directors from medium size school districts may utilize and rely on KPIs more than directors from small districts, and therefore have a greater understanding of what is involved in accurately calculating and interpreting KPIs. However, no significant findings were revealed when comparisons were made between school district enrollment size and usage of KPIs.

School nutrition directors from medium and large districts are more likely to perceive that KPIs are a valuable to for managing SN operations. As stated earlier, this may indicate that SN directors from medium and large size schools districts have more experience and training related to the utilization of KPIs, and therefore, a greater appreciation for the value of KPIs.

Applications

Based on the findings of this study, it is recommend that further research be conducted to develop a resource to support school nutrition directors, managers, and supervisors regardless of

district size in effectively utilizing KPIs. This resource should be based on the information captured in Phase IV of this study.

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