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IMPLEMENTING COMPONENTS OF THE CAFETERIA POWER PLUS PROJECT AND THE FIVE-A-DAY POWER PLUS PROJECT WITH THE CATCH'S GO, SLOW & WHOA PROGRAM TO INCREASE FRUIT AND VEGETABLE CONSUMPTION IN COMMUNITY ELIGIBILITY PROVISION ELEMENTARY SCHOOLS IN LEXINGTON, KY

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IMPLEMENTING COMPONENTS OF THE CAFETERIA POWER PLUS PROJECT
AND THE FIVE-A-DAY POWER PLUS PROJECT
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TO INCREASE FRUIT AND VEGETABLE CONSUMPTION IN COMMUNITY ELIGIBILITY PROVISION
ELEMENTARY SCHOOLS IN LEXINGTON, KY.

CAPSTONE PROJECT PAPER

A paper submitted in partial fulfillment of the
requirements for the degree of
Master of Public Health
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Lexington, Kentucky

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ABSTRACT

Poor diet quality is a leading risk factor for many chronic diseases affecting Americans today. Increasing consumption of fresh fruits and vegetables during childhood helps to protect against chronic diseases in adulthood and overall prolonged healthier habits. Since 1988, trends in fruit consumption remain unchanged in the United States and vegetable consumption has slightly decreased. Communities living under the poverty level have a greater disparity for access to and consumption of fresh fruits and vegetables. This proposal is given by the Lexington Fayette County Health Department (LFCHD) and combines aspects of three evidence-based programs: the 5-a-day Power Plus Project, the Cafeteria Power Plus Project and the CATCH'S Go, Slow and Whoa campaign to increase fresh produce consumption in elementary schools. The proposed program will benefit almost 1,800 fourth and fifth grade students at ten Community Eligible Provision (CEP) elementary schools in Fayette County, Kentucky where school breakfast and lunch are provided to all students free of charge. Teachers, cafeteria workers, other school staff and peer leaders in conjunction with the LFCHD dietitians from the Community Health Education and Equity department will disseminate the program throughout each school year through integrated classroom lessons, environmental changes to the food service line, encouragement from food service workers and more. Monthly taste tests of fresh fruits and vegetables will occur as well as friendly competitions to incorporate more fresh produce into breakfast and lunch meals at school. Process evaluation will assess the monthly food challenges, maintenance of program materials, number of integrated lessons given, fruit and vegetable purchased by the schools and fidelity among teachers and food service staff. A pre and post-test with delayed implementation in control schools will measure various outcomes of the proposed program. Data will be collected through photo analysis of food consumption and self-reported surveys. Short-term outcomes are increased knowledge of the benefits of eating fresh produce; increased fruit and vegetable consumption at school-provided meals and increased student willingness to try new fruits and vegetables. Long-term outcomes for the program include reduced childhood obesity in Fayette County and decreased rates of obesity-related diseases in Fayette County adults.

TARGET POPULATION & NEED

In 2014 the CDC estimated that approximately 17.4 percent of children aged six to eleven years in the United States of America were obese and greater than one third of children were either overweight or obese [1]. Childhood obesity is linked to many ill-health outcomes including type two diabetes, heart disease, asthma, sleep apnea and more [2]. Among the most important factors leading to pediatric obesity are poor diet and low socioeconomic status [3, 4, 5, 6, 7, 8, 9]. Amid this epidemic, it is important for public health researchers and workers to find solutions to improve the longevity and quality of life for America's youth.

Poor diet quality is a leading risk factor associated with many diseases and death in the United States [10]. Eating a diet high in fresh fruits and vegetables can help protect against many chronic diseases such as type 2 diabetes, heart disease, some cancers and obesity [10]. The CDC reported in 2011 that fewer than one in ten Americans ate enough fruits and vegetables based on the My Pyramid recommendations for age, sex and activity level [11]. Since 1988, trends in fruit consumption have not changed in the United States and vegetable consumption has slightly decreased [10]. The National Health and Nutrition Examination Survey found that sixty percent of children in the United States of America did not eat enough fruit to meet daily recommendations and ninety-three percent of children in the United States did not eat enough vegetables to meet daily recommendations between 2007 and 2010 [11]. Consuming the recommended number of fruits and vegetables daily is a widespread problem in the United States. Increasing a child's daily fruit and vegetable consumption as a part of developing overall healthy habits can lead to healthier behaviors as an adult [10].

Along with poor diet, low socioeconomic status is also directly related to childhood obesity [3]. Factors such as access to healthy foods, especially fresh fruits and vegetables, exacerbate this relationship. The CDC recommends a multi-faceted approach to improving population level dietary habits such as improving availability and affordability of healthy foods where Americans live, work, learn

and play [10]. For children, schools play a vital role in access to and delivery of healthy foods, notably for children who qualify for free and reduced lunch. Schools provide access to foods for many American children each day and are an important venue for obesity prevention and healthy eating promotion, especially among Community Eligible Provision (CEP) schools [10]. CEP Schools offer breakfast and lunch at no charge to all students at the school [12]. Schools are designated as CEP if at least forty percent of students qualify for any kind of federal assistance [12]. CEP designation is directly related to the school community having a high percentage of economically disadvantaged students.

The problem of reaching the appropriate daily fruit and vegetable intake is widespread in the United States while the challenge in communities living under the poverty level is even greater. The national average for people living below the poverty level in the United States is 14 percent while the average living in Fayette County, Kentucky below the poverty line is 17.7 percent [13]. Fayette County, Kentucky has a total of 35 public elementary schools and 21 of those schools are CEP designated [12]. Improving access to fruits and vegetables at these schools would directly help children living below the poverty level in Fayette County.

The proposed program combines three evidence-based interventions to focus on increasing access to and promotion of fresh fruit and vegetable consumption for elementary aged children attending the designated schools. The intervention combines elements of the Cafeteria Power Plus Project, the 5-a-day Power Plus Project and The CATCH's Go, Slow & Whoa Program to increase fruit and vegetable intake as well as help children to identify and make healthier food choices. This combined intervention will work to increase fruit and vegetable intake in low-income Fayette County elementary schools by changing the school environment and student behaviors to try more fruits and vegetable and encourage them to make healthier choices at provided breakfast and lunch meals. The 'Go Slow and Whoa' program will be implemented in the school cafeteria environment and highlight which types of foods

should be eaten regularly as a part of a balanced diet based on the Go (eat frequently), Slow (eat sometimes) and Whoa (eat rarely) designations [15, 16, 20].

The Fayette County Health Department is partnering with 10 Elementary schools in Fayette County to be a part of this intervention. The study design for the proposed project is a pre and posttest with a control group with delayed implementation of the program for the control group. Five schools will be used as a control to measure against the first five intervention schools during the 2020-2021 school year. Upon the first year's completion at the five intervention schools, the five control schools will begin to receive the intervention in year two of this grant. The schools were randomly selected from the 26 elementary schools in Fayette County where breakfast and lunch are provided free of charge. There are 11,269 children enrolled in twenty-six elementary schools in Fayette County, Kentucky for the 2017-2018 school year and enrollment at the 10 chosen elementary schools is 5,285 students with 1,763 students enrolled in the fourth and fifth grades [14]. This intervention will directly impact 1,763 student's willingness and efficacy to try new fruits and vegetables, increase access to fruits and vegetables, develop an easy reminder to choose healthy foods and encouragement to eat these foods regularly and indirectly impact the entire school population. The schools chosen for this intervention in Fayette County, Kentucky include the following:

1. Dixie Elementary – 591 students (197 students in 4th and 5th Grades)
2. Harrison Elementary – 266 students (89 students in 4th and 5th Grades)
3. James Lane Allen Elementary – 493 students (164 students in 4th and 5th Grades)
4. Julius Marks Elementary – 713 students (238 students in 4th and 5th Grades)
5. Lansdown Elementary – 613 students (204 4th and 5th Grade students)
6. Mary Todd Elementary – 497 students (166 4th and 5th Grade students)
7. Meadowthorpe Elementary – 486 students (162 4th and 5th Grade students)
8. Milcreek Elementary – 563 students (188 4th and 5th Grade students)

9. Northern Elementary – 539 students (180 4th and 5th Grade students)

10. Picadome Elementary – 524 students (175 4th and 5th Grade Students)

Increasing consumption and awareness of fruits and vegetables in elementary children aged five to twelve is beneficial for overall health. Developing early habits to choose fresh, healthy foods over foods that are processed and high in sugar and fat can have lifelong benefits and reduce the risk for costly chronic disease, obesity and death.

PROGRAM APPROACH

The CDC recommends a multi-faceted approach to change population dietary habits such as improving availability and affordability of healthy foods where we live, work, learn and play [10]. The proposed intervention combines pieces of three evidence-based programs: the Cafeteria Power Plus Project, the 5-a-day Power Plus program and the CATCH's Go, Slow and Whoa campaign, which are each geared toward increasing daily fruit and vegetable consumption in elementary aged children.

Combining aspects of these programs with environmental changes in the school cafeteria will promote healthy eating choices and specifically, increase fruit and vegetable intake at school provided breakfast and lunch. These programs focus on promotional activities and lessons to engage elementary students in trying new fruits and vegetables, encouragement to incorporate these foods during school provided breakfast and lunch and efficacy to know what foods are more nutrient dense and should be chosen more often. The proposed multi-component program includes classroom curriculum and incentives among peers to taste new fruits and vegetables, environmental changes to the way fruits and vegetables are presented in the cafeteria and encouragement from cafeteria staff and peer leaders to incorporate them into their daily consumption.

The 5-a-day Power Plus Project (5PPP) is a multi-component program aiming to increase overall consumption of fruits and vegetables [15]. 5PPP consists of: (1) content incorporated into classrooms; (2) parental involvement and education; (3) school food service changes and (4) food industry support

and involvement [15]. Fourth and Fifth grade students at participating schools participated in sixteen forty-five-minute lessons with their classroom teachers that focused on problem solving, skill-building, snack preparation and taste-testing [15]. The curriculum was tailored for this project and used comic book and adventure stories to relay the messages. Students participating in this project formed teams and competed to see who could consume more fruits and vegetables at lunch; small prizes were offered as an incentive. The parental involvement consisted of information and activity packets brought home by the fourth and fifth grade students as well as snack-packs that were prepared by the school's food service staff, containing fruits and vegetables. The food service portion of this program encouraged selection and consumption of fruits and vegetables using four key strategies: (1) point-of-purchase promotion; (2) enhancing the attractiveness of the fruits and vegetables presented; (3) increasing the variety of fruits and vegetables offered; and (4) providing an additional fruit item on days a baked dessert was served [15]. Cafeteria staff put together sample trays and signs showing students the available choices of fruit and vegetables daily. The final component of the 5PPP involved a local coalition centered around increasing fruit and vegetable consumption and a local produce supplier to provide fruits and vegetables for classroom taste tests and provide additional educational material through 30 minutes presentations.

Evaluation from the 5PPP supports previous research that multi-component school-based behavioral programs improve health behaviors of children in schools, including those with ethnic and socioeconomic diversity [16]. Through direct observation by researchers, this program had significant results with: (1) increased fruit consumption at lunch; (2) increased combined fruit and vegetable consumption among all children and (3) increased vegetable consumption among girls at lunch [16]. The classroom component of this program provided motivation for children to choose more fruits and vegetables on their lunch tray during the intervention. The food service component increased the opportunity to consume fruits and vegetables and results imply that combined classroom and cafeteria

components successfully made a difference in children's eating habits. The parental component of this program presented room for growth as there were no significant results from the self-reported parental data collected from this program.

The second component of the proposed program is the Cafeteria Power Plus Project (CPPP), which builds on some of the principles of the 5-a-day Power Plus Project. This project emphasizes changes in the social-environmental factors at schools, primarily in the cafeteria and lunch line [16]. This program aims to: (1) increase opportunities during school lunch to eat a variety of fruits and vegetables; (2) provide healthful peer role models who eat fruits and vegetables and (3) establish social support and encouragement for children to eat more fruits and vegetables at lunch [16]. One goal of the CPPP was to increase exposure, availability and accessibility to fruits and vegetables and therefore increase consumption [17, 18, 19]. Environmental changes made to the cafeteria and lunch line include enhancing the appeal of these foods by: (1) pre-slicing; (2) displaying them in small cups and (3) arranging the choices by color [16]. Additional changes include providing daily encouragement to take these foods as well as increasing the quality by providing fresh fruits and vegetables rather than canned or pre-packaged in syrup, etc. [16]. Another goal of CPPP is to increase the quantity of offering of fruits and vegetables with at least one additional serving of each presented daily during the intervention. Monthly samples of fresh fruits and vegetables that were unfamiliar to many students were brought in for every student to taste including: sugar snap peas, red peppers, jicama, blueberries, pineapples and spinach [16]. Following the taste test, these foods were served regularly throughout the month as an additional choice in the cafeteria. A competition week occurred at the midpoint of each year of this program to challenge students to eat three servings of fruit and vegetables per day at lunch. Classes were rewarded at the end of the week if, on average, they met that goal [16].

Overall, evaluation of the Cafeteria Power Plus Project showed that environmental changes to an elementary school's cafeteria can significantly impact a child's total fruit and vegetable consumption,

primarily increasing children's fruit consumption while at school [16]. Further, this program suggests that multi-component programs are more effective at increasing fruit and vegetable consumption in young children [16]. While CPPP increased overall fruit and vegetable consumption in school children, the impact was less intense than multi-component, school-based interventions [16]. The strongest component of CPPP was the verbal encouragement by food-service staff; process evaluation of this component found it to be linked to all outcomes measured [16].

The CATCH's Go, Slow and Whoa Campaign highlights the importance of creating an environment that encourages, promotes, supports and simplifies the decision to make healthy food choices [20]. Notably, school cafeterias and lunch lines provide an ideal environment for these decisions to be made and practiced on a regular basis [20]. Due to its impact, the Go, Slow, Whoa concept is widely used across America in schools, health departments, after school programs, camps, and much more as a way to empower children to correctly identify and choose nutrient dense foods over less nutritious foods. The U.S. National Heart, Lung and Blood Institute suggests this concept as a beneficial way to label and think about food for children [21]. The Lexington Fayette County Health Department uses these designations within their nutrition learning materials currently and has for many years. The CDC uses the Go, Slow and Whoa food designations in their mobile game for children entitled 'Dining Decisions' where you must sort foods based on the proper category. The Dupage County Health Department in Illinois, which encompasses the outskirts of the city of Chicago, regularly introduces the concepts of Go, Slow and Whoa foods to Kindergarten and First grade students as a first lesson about healthy eating choices and adapts its message for older kids according to its website [22].

Table 1: Program Components and Adaptations

	Program Components Kept	Program Components Removed	Adaptations	Expansions
5-a-day Power Plus Project	<ul style="list-style-type: none"> -Integrated curriculum in 4th/5th grades -School food service changes -Additional produce offered during meals -Delayed implementation study design 	<ul style="list-style-type: none"> - Parental involvement and education - Food industry support and involvement 	<ul style="list-style-type: none"> -Photo analysis of school meals 	<ul style="list-style-type: none"> -Expand number of lessons integrated into curriculum -Include both school-provided meals of breakfast & lunch
Cafeteria Power Plus Project	<ul style="list-style-type: none"> -Cafeteria encouragement -Monthly taste test -Rearrange fruit & vegetable presentation in lunchroom -Additional produce offered during meals -Friendly competition each monthly -Provide healthful peer role models 	<ul style="list-style-type: none"> - Monthly snack packs sent home 	<ul style="list-style-type: none"> -Photo analysis of school meals 	<ul style="list-style-type: none"> -Include both school-provided meals of breakfast & lunch
Go, Slow & Whoa	<ul style="list-style-type: none"> -Signage in cafeteria -Materials to identify the three categories of foods -Interaction and encouragement from school staff 			<ul style="list-style-type: none"> -Print materials in English and Spanish

This multi-component intervention will focus on fourth and fifth grade students in the ten chosen elementary schools. These ten schools serve a high percentage of students living at or below the poverty level with at least forty percent of the students receive government assistance in one form [12]. Based on the Community Needs Assessment performed by the Lexington-Fayette County Health Department, the proposed program looks to fill a nutritional gap for these children while they attend school. The proposed program aligns with the needs of these children including better access to fresh fruits and vegetables. During the first school year, five schools will be randomly selected to receive the proposed program while the other five will serve as the control schools for comparison in school year one. The following school year, the five control schools will begin receiving the proposed program. Each school will be given \$5,000.00 per semester they participate in funding to cover the costs of additional fruits and vegetables being served at lunch. Schools already have contracts with produce providers and access to the most competitive pricing. Promotional materials will be provided to each of the five schools to display in the cafeteria, hallways, administrative offices, school nurse and classrooms. The program will run on an opt-in participation basis for data collection; during the first week of the school year, an information sheet will be sent home to all parents at each of the ten schools advising them of the program and offering parents a way to opt their children out of the data collection portion of the study.

The proposed program will begin in January 2020, beginning with the planning phase of our program and includes meetings with stakeholders, school principals and the formation of the Community Advisory Group. Within the first month of this grant, the ten chosen schools will be randomized to be either a control or intervention school for the following school year. The randomization of schools will happen early in the process because a core group of teachers will then be chosen to hire on a contractual basis for the grant. The core group of teachers will be comprised of one or two 4th and 5th grade teachers from each of the five participating intervention schools. Teacher buy-in is a main priority

of this project as they face the greatest burden in the school with the integrated classroom curriculum that will occur twice per week. The core teacher group will help to ensure education materials align with school standards and can practically fit into their school year. This teacher group will update educational materials and help to oversee all finalized program adaptations. Over the summer of 2020, this core teacher group will participate in a retreat with program staff, including a dietician, to brainstorm, review and change the nutrition curriculum that will be integrated into their classes twice per week. They will also be responsible for deciding how teachers and cafeteria workers will be observed for program fidelity, either directly or indirectly by research staff or they might choose they prefer to observe each other.

After the core teacher group returns from their retreat and program lessons are complete, training of all staff will occur in July, 2020. All members of the cafeteria staff at the five intervention schools and the fourth and fifth grade homeroom teachers will participate in incentivized trainings for the 2020-2021 school year. Peer leaders will be selected by the teachers during this training and a letter will be sent to those students to see if they are willing to participate throughout the year in exchange for service hours.

Once the school year begins in August of 2020, baseline data will be collected at all ten schools. Then program curriculum will be implemented twice per week from September to April, allowing ample time for data collection before the curriculum begins and after it ends. The teachers will decide the most efficient way to integrate the nutrition lessons into the ongoing curriculum whether it be to the entire grade or in each individual class; peer leaders will help them with the lessons when possible and will also facilitate the monthly taste tests that will occur each month in the classroom. Peer leaders will not only be healthful role models for their peers but also encourage them to try the new fruits and vegetables offered at breakfast and lunch. Friendly competitions between classes will occur each month

to see who ate most of the new produce offered; students will receive a ticket when they choose the fruit or vegetable of the month and small prizes will be given to the class who consumed it more often.

Prior to the school year beginning in 2020 and after training has been completed, changes to the cafeteria will be made. Training of the food service staff will be facilitated by the dietitians working on this program and the staff will help to rearrange the food service line in a way to place focus on the fresh fruits and vegetables being offered. The school cafeteria will promote and highlight all fresh fruits and vegetables available during meals in a visibly pleasing way that sticks out to the students in line as well as offer more than the standard number of fruits and vegetables to choose from. They will also be involved in sign placement for the Go, Slow and Whoa campaign since they know where students will see these the most. Suggested scripts will be given to all the workers with copies maintained in the food service line to encourage students to choose fresh produce daily and align it with the core messages of the Go, Slow, Whoa campaign. Teachers will reinforce the Go, Slow and Whoa food designations through tailored lessons and school administration will also emphasize their meaning at school wide assemblies and through the morning announcements. For a detailed timeline of the proposed program over the course of the three years, see the attached Appendix: Gantt Chart.

School Health Policies and the proposed program

The proposed program does not present any known conflicts with the existing school health policies at each of the ten schools. Overall, it strengthens and supports the wellness policies as guided by the Child Nutrition and WIC Reauthorization Act of 2004 for schools that participate in federal meal programs and aligns with the message of offering a nutritional, diverse menu and range of offerings for students to choose from at two meals each day of the school year.

It should be noted that a list of additional resources will be given to the schools for students who face extreme obesity or seem severely underweight including a list of local programs and medical providers to be delivered to that specific student's parent or guardian. During all staff trainings,

guidelines for classifying students as severely obese or underweight will be reviewed to better identify and aid those families where needed. Further, if any stigma or trauma is reported by any student during the project duration, it will be immediately reported to the school team, researchers, parents of the affected student and a full investigation will take place. If sensitive information is discovered or reported during the program duration, local government rules for reporting will be strictly followed when applicable.

Adaptations

Some adaptations will be made to the original programming to strengthen and magnify the results of the proposed intervention. Specifically, breakfast will be included as a part of the intervention, instead of just lunch, because as previously seen, the greatest impact was made at school-provided lunch, rather than when students ate their meals at home [15]. Incorporating the proposed program to school-provided breakfast allows another opportunity for children to eat more fresh fruits and vegetables. Another adaptation to the original program components is how the amount of food consumed is observed. Instead of choosing students to physically observe eat during breakfast and lunch, a photo analysis will be completed for all participating students in the fourth and fifth grades. Lunch trays will be labeled with a random number and a photo will be taken of the tray only on their way out of the lunch line; when the student returns their lunch tray, another photo will be taken of the tray to see what has been consumed. Photo analysis of the lunch trays will allow researchers to measure: (1) What foods were chosen from the lunch line; (2) Approximate how much was consumed and (3) whether or not the fresh fruits and vegetables were eaten.

Community Advisory Group (CAG)

A Community Advisory Group (CAG) will be formed prior to the start of the 2020-2021 school year. The CAG will review all changes to ensure that materials are age-appropriate and culturally diverse; some materials will also be printed in Spanish to serve the needs of various schools in the Fayette

County school district. Dieticians from the Community Health Education Department will be involved to ensure that the curriculum is medically accurate and nutritionally appropriate. The members of the CAG are listed below, and the group is composed of important members of the Lexington, Kentucky community with expertise related to nutrition, fruit and vegetables and working with youth.

<i>Table 2: Community Advisory Group Membership.</i>		
<i>Name</i>	<i>Organization</i>	<i>Expertise</i>
Dr. Marcus Swan, PhD, Associate Professor of Health, Behavior & Society	University of Kentucky, College of Public Health	Farm to School; Fruit and Vegetable consumption in schools
Dr. Bari Lewis, Pediatrician	Pediatrics & Associates	Child and adolescent health
Crystal Keller, Team Leader, Community Education Department	Lexington-Fayette Urban County Health Department	Public Health; Leadership
Helen Smith, Director	Dunbar Community Center, Lexington, Kentucky	Lexington, KY youth services; education
Adrian Sterling, Youth Services Director/Youth Sports Coach	Lexington Parks & Recreation	Lexington, KY youth services; educator; leader
Michelle Coker, Director of Child Nutrition/Food Services	Fayette County Public Schools	School breakfast and lunch programs; school nutrition guidelines
Patti Riggs, RN, School Nurse	Northern Elementary School/Fayette Co. Public Schools	Youth clinical health
Adele Martin, PTA President	James Lane Allen Elementary School	Parent perspective; school policy; leadership
Eleanor Hix, Cafeteria Supervisor	Picadome Elementary School	School nutrition guidelines; frontline experience
Arion Jett, 4 th Grade teacher	James Lane Allen Elementary School	Teacher perspective

Training

Teachers will participate in an incentivized training once per semester with the Community Education dieticians and Bluegrass Community Health Coalition. Cafeteria workers will take part in a training at the beginning of each school semester where they will learn techniques to encourage healthy eating at breakfast and lunch, specifically inspiring students to taste and consume more fruits and

vegetables. Cafeteria workers will emphasize personal responsibility in making healthier choices in a positive, upbeat way, while also adhering to the Go, Slow and Whoa message. Peer ambassadors will be chosen from each grade to actively model appropriate food choices during breakfast and lunch and these leaders will meet twice per semester with program directors, dietitians and the Family Resource Coordinator to give feedback and gain new insight on how to better lead those around them to choose healthier foods regularly. Several studies, including the Cafeteria Power Plus Project, show the influence peer leaders have on behavior change and for this program specifically, increasing fruit and vegetable intake [15, 16].

The logic model and Gantt chart for this program can be found in the appendix with specific details about the planning phase, implementation of the program, expected short-term and long-term outcomes as well as expected public health impact. The grant will be implemented based off the logic model and Gantt chart timeline of activities.

Dissemination

In subsequent years, children who participated in the program will be recruited to implement the same strategies and encouragement for the students in grades below them to reinforce healthy choices daily at school where two meals are offered at no charge. Eating fruits and vegetables daily should become a campaign for the intervention schools in the years to follow so lifelong health can coincide with core educational topics.

The proposed program is cost-effective and easy to replicate. Beyond the scope of this three-year program, the Lexington Fayette County Health Department will continue to expand the program to the remaining Community Eligible Provision elementary schools in Lexington and ultimately the entire school district. Long-term, our vision for this program will increase fresh produce consumption among Lexington youth and reduce the burden of childhood obesity in Lexington including obesity related diseases.

PERFORMANCE MEASURES & EVALUATION

The proposed program will be evaluated in several ways, and ongoing throughout the three-years. This will consist collecting performance measure data, and conducting process and outcome evaluations. This evaluation will be done using an opt-out consent procedure, where parents can choose for their kids not to participate in the evaluation.

Performance Measures

Consistent with application guidelines, we will collect key demographic information to report on students. Although the entire program is centered around the fourth and fifth grades, all children attending the school will be exposed to at least some of the curriculum. Therefore, demographic information will be collected from school records, including age (date of birth), sex, and race/ethnicity; no personal identifiers will be collected. This information is routinely collected from all students at the beginning of the year. The Lexington-Fayette County Health Department is familiar with grant reporting requirements, and will ensure that the performance measure data is reported semi-annually as required.

Process Evaluation

As part of the process evaluation, we will track the follow items:

- 1) Did the monthly food challenge happen? This involves introducing students to a new food each month, and then having that food available in the cafeteria. There is also a grade-level competition on how often students in each grade choose to consume.
- 2) Maintenance of program materials in the cafeteria, school nurse office and family resource centers, and classrooms
- 3) Number of lessons implemented in each classroom
- 4) Observation of classroom teachers and cafeteria workers

5) Food purchases by the schools to assess fruit and vegetable purchases

Observation of cafeteria workers and classroom teachers will be done to assess program fidelity; the core group of teachers will decide how this observation is completed. Each school will have three to five observations per semester. An observation rubric will be developed alongside the lesson modification. For the cafeteria, part of this will be an environmental assessment – are the program materials and displays according to guidelines? Further, we expect the cafeteria workers to be encouraging foods based on the Go, Slow, and Whoa categories and promoting additional fruits and vegetables that are available to students. This has previously been found to be an important predictor of program success, since they are right at the point of sale and can help influence their decision [15, 16]. What is observed in the cafeteria and classroom will be used to determine training needs, particularly if a mid-year refresher training should be implemented to improve fidelity. This information may also be used to determine if more training is needed at the beginning for teachers and/or cafeteria workers. For the wait-list schools, additional training could be implemented from the start.

Continuous process evaluation will occur over the three-year grant to ensure information is being disseminated in the appropriate way for each grade level and that students feel empowered to taste and choose more fruits and vegetables daily. Process evaluation will ensure that the program is implemented with fidelity; intervention schools will be monitored in both the cafeteria and classroom lessons to ensure all participants receive the same level of encouragement, learning and more.

Lessons learned and challenges will be collected each semester, and will be reviewed by the CAG to improve implementation the following semester. These lessons may also impact the program implementation at the wait-list schools or the amount of training required.

Focus groups will be conducted among teachers and cafeteria workers to gather information about perceived challenges and concerns. These focus groups will be conducted prior to implementation to help facilitate the work of the dietician and CAG as they update the lessons. Additional focus groups

will be conducted during the program's implementation to collect data on actual challenges that need to be addressed. The goal would be to determine how the teachers can be better supported during implementation. For example, do they need additional resources or better guidelines for the lessons?

Outcomes Evaluation

Outcomes goals for this project are:

- 1) Increase knowledge of the benefits of eating more fruits and vegetables
- 2) Increased fruit and vegetable consumption
- 3) Increased willingness to try new fruits and vegetables

Surveys will be conducted twice per school year: September and May. These align with the beginning and ending of the school years and can be changed if the core teacher group presents a better time to collect data and based on standardized testing dates. Data about fruit and vegetable choice and consumption will be collected in both the intervention and control schools. Data collection from the children will include self-reported data via surveys (based on the Health Behavior Questionnaire) as well as observed consumption of fruits and vegetables through photo analysis of breakfast and lunch trays. With the permission of 4th and 5th grade parents, food trays will be randomly labeled, and a picture taken of the before and after consumption will be used to assess what foods were chosen and how much was consumed.

<i>Table 3: Self Reported Health Behavior Questionnaire</i>	
<i>Measure</i>	<i>Brief Description</i>
Fruit and Vegetable Consumption	This measure asks children to report on consumption at specific times through the day. Cronbach's alpha = 0.84
Fruit and Vegetable Consumption Recall from Yesterday	This measure asks children if they ate a certain fruit or vegetable yesterday (13 items). Cronbach's alpha = .67
Fruit and Vegetable Consumption of Family Members	This measure asks children to report how often their family members consume fruits and vegetables. Cronbach's alpha = .69
Who wants you to eat Fruits and Vegetables?	This measure asks children to report if teachers, peers and cafeteria workers want them to eat fruits and vegetables at specific times through the day. Cronbach's alpha = .92 (Teachers) Cronbach's alpha = .90 (Peers) Cronbach's alpha = .92 (Cafeteria Staff)
Which food would you choose to eat?	This measure presents two foods, a fruit or vegetable and another type of food, and asks which the child would choose to eat

In addition to the measures in the table above, other items will include: 1) total servings of fruits and vegetables on the previous day; 2) perceived total servings of fruits and vegetables needed daily for good health; 3) Additional items from the CATCH Kid's Club Survey will also be incorporated (see Appendix).

As part of the monthly food challenges, each child who selects the new fruits or vegetable from the lunch line will receive a ticket to enter a drawing for a small prize. These tickets will also be counted each month to see if more students are participating in these challenges over time.

One potential challenge to data collection efforts will be absences or children who have changed schools throughout the school year. For children who happened to have moved to another intervention school, they will still be included in the evaluation. Data for children who have completed at least two surveys but then are loss to follow-up will also be included. Data of children with only data point will be excluded. Another potential challenge to data collection will be the chance of cancellation due to weather; under this circumstance, data collection days will be rescheduled.

CAPACITY AND EXPERIENCE OF THE APPLICANT ORGANIZATION

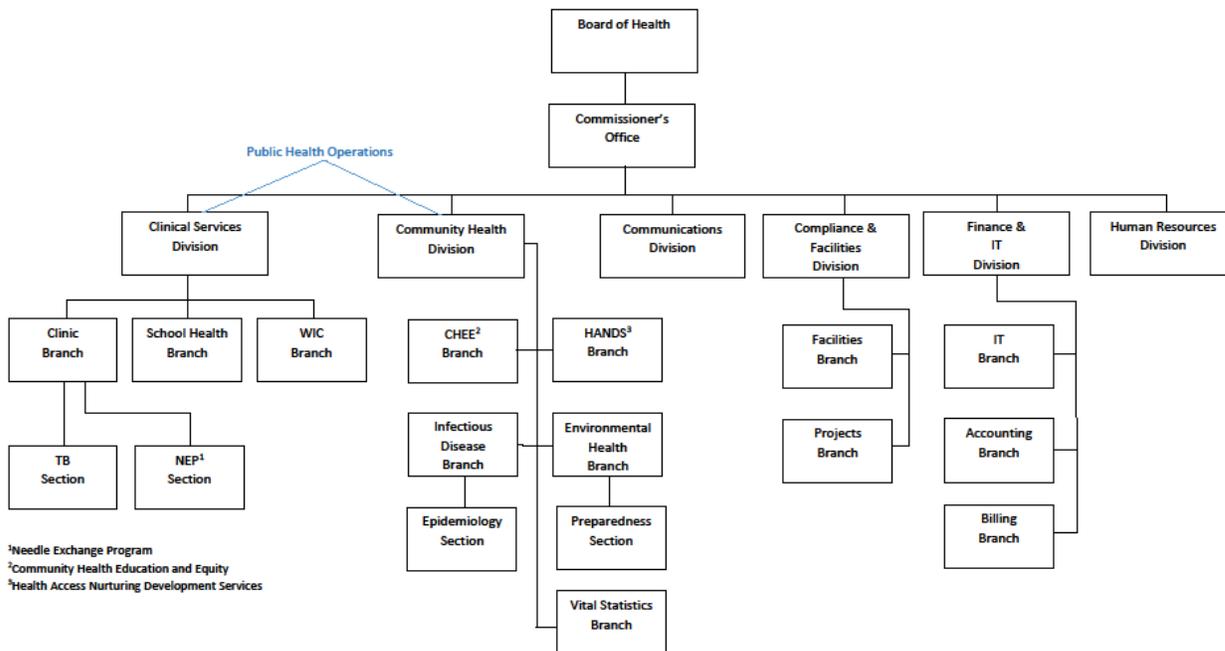
The Lexington-Fayette County Health Department (LFCHD) will administer the proposed program in the ten chosen schools. The proposed program aligns with the ‘helping Lexington be well’ mission statement of the LFCHD and their vision ‘to move Lexington toward being one of the healthiest communities in the nation’ [23]. The LFCHD is overseen by the Commissioner of Health and governed by the thirteen members of the Board of Health, a group of people that determine long-range planning and set goals for the future direction of the health department including the Mayor, doctors and more [23]. The LFCHD currently offers a variety of preventative health programs and education opportunities for the children and adults of Lexington, Kentucky and is a valuable resource for information and services relating to school health, nutrition, diabetes, immunizations, health screenings, safe needle exchange, WIC, family planning, environmental health, STI’s, tobacco cessation and more.

The LFCHD recognizes childhood obesity and access to fresh fruits and vegetables as a threat to the overall health of Lexington’s youth. The LFCHD acknowledges that the proposed school-based program will help to address this problem especially among some of the city’s most economically disadvantaged children attending these elementary schools.

The LFCHD is broken down into two Public Health Operations: The Clinical Services Division and the Community Health Division. The proposed program is unique in that it will require both Divisions of the LFCHD to strategize, implement and disseminate information to the ten schools. The School Health

branch falls under the Clinical Services Division of the LFCHD which works directly with Fayette County Public Schools to provide school nurses and offer first aid services, administer prescribed medicines as well as give nutrition education for children with specific health needs like diabetes. The Community Health Education and Equity branch falls under the Community Health Division of the LFCHD and the dietitians in this department regularly collaborate with Fayette County Public Schools to offer nutrition education, cooking classes and Farm to School lessons highlighting the importance of eating local, fresh fruits and vegetables. The proposed program provides an additional opportunity for these two divisions to work together in the school system to promote increasing intake of fresh fruits and vegetables daily. The organizational chart of the LFCHD directly below shows which departments will be directly involved in the implementation of the proposed program.

Lexington-Fayette County Health Department



The LFCHD has the staff and tools in place to carry out the proposed program and already provides evidenced based programs in the Lexington community like a safe needle exchange, the Cooper-Clayton

Smoking Cessation Method and the Health Access Nurturing Development Services (HANDS) for new and expecting parents. The LFCHD was nationally accredited in 2014 by the Public Health Accreditation Board. The LFCHD has policies in place to provide opportunities to all people regardless of economic status and does not discriminate based on age, disability, race, color, ethnic or national origin, religion, political belief, sex, sexual orientation or marital status. Additionally, the LFCHD strictly prohibits discrimination, sexual harassment and violence of any kind in the work place.

PARTNERSHIPS AND COLLABORATIONS

The LFCHD will partner and collaborate with key stakeholders in the Lexington/Fayette County community and within the ten participating schools to successfully implement the proposed program. Each of the organizations listed below offers something unique as related to the youth in the Lexington/Fayette County community as well as fresh fruit and vegetable consumption. Each of these organizations already serve many of the youth that will participate in the proposed program with free programming offered throughout the local community.

<i>Table 4: Community Partners</i>	
Organization	Expertise
Lexington Famers Market	Local fruits and vegetables; connecting with farmers
Lexington Public Library	Education; family and youth programming
Farm to School, Lexington, KY	Local fruits and vegetables; school policies
Glean KY	Local fruits and vegetables; making important connections; serving Central Kentucky
Bluegrass Community Health Coalition	Health promotion in Central Kentucky
Family Resource & Youth Services Coalition of Kentucky	Family and youth assistance in Central Kentucky; diversity
Kentucky Cabinet for Health & Family Services, Division of Child & Maternal Health	Family and youth health; making important connections; governmental agency

The Lexington Farmers Market connects the Fayette County community with farmers and locally grown produce year after year. This will be an important partnership for the proposed program as the

Farmers Market can provide additional fruits and vegetables to the schools that are locally grown and harvested. Glean, KY is another important partnership for the proposed program as they work hard to connect produce suppliers with aging fruits and vegetables to people in need. The mission of Glean, KY is to gather and redistribute excess fruits and vegetables to nourish Kentucky's hungry. Glean, KY reduces food waste and currently serves more than one hundred local feeding programs. The connection with Glean, KY could help schools offer a greater variety of produce at breakfast and lunch free of cost.

The Lexington Public Library offers free programs to Lexington youth from birth through high school with services ranging from story time to homework help as well as specific classes about nutrition, healthy cooking, reading services and much more. Many students who participate in these free programs attend the schools that will participate in the proposed programs and the Lexington Public Library offers after school programming at schools across Fayette County.

The partnership with the Lexington Parks and Recreation Department (LPRD) is also key for the proposed program as many children attending the ten chosen schools participate in after school activities and sports through this agency. The Youth Services Director of LPRD as well as other vital members in this department, including youth coaches and after school workers, can offer different perspectives on challenges these children face in regard to healthy eating and accessing fresh fruits and vegetables. They also serve as a role model for whom behavior can be modeled after and a place where the core program messages can be integrated and reiterated outside of the school day.

Program partners and collaborators will receive a comprehensive report, upon program completion, detailing program results, analysis and how it should be used in the future. In addition to the people and agencies listed above see the attached Letters in Support of this Program from Linda Gorton, Mayor of Lexington, Kentucky; Manny Caulk, superintendent of Fayette County Schools; and various teachers, cafeteria workers and other staff from the participating elementary schools.

PROGRAM MANAGEMENT

The following staff members will manage, implement and monitor the proposed program. A summary of their work experience and expertise as well as their role within the proposed program are detailed below:

Dr. Craig Hamburg, MD/MPH is the Health Commissioner of the Lexington Fayette County Health Department and will serve as the Program Coordinator and Financial Manager for this project with a fifteen percent effort on the proposed program. He is a Pediatrician by training, graduating from Yale University's Medical School, and has an extensive public health background in epidemiology of communicable diseases and emergency preparedness and response. He obtained his Masters of Public Health from Johns Hopkins University. His diverse medical and public health background along with his leadership experience will be an asset for the proposed program. He will be primarily responsible for planning and maintaining the program budget, tracking expenses and ensure project activities are administered on-time. He will work closely with the Project Director to coordinate meetings with the Community Advisory Group and sign grant agreements with partners on behalf of the LFCHD. Dr. Hamburg will also help develop financial reports for each year of the project and ensure that the funding awarded is consistent with the CDC's financial guidelines and procedures.

Crystal Keller, DPH is currently the community education director at the Lexington Fayette County Health Department and she will serve as the Project Director for the proposed program with a seventy-five percent effort. She has her Doctorate in Public Health degree from the University of Kentucky and her expertise includes maternal and child health, forming community coalitions and effective leadership. Her primary responsibility for the proposed project will be planning and implementing the program, confirming fidelity in the dissemination of the program, adapting the evidenced based programs for the current project, creating progress reports for the funding agency and

partners of the program and more. She will supervise all staff members of the proposed program and motivate the research team to achieve the goals of the proposed program.

Mel Smith, Nancy Shiner and Tara Ross are registered dieticians at the LFCHD and will assist the Project Director in day to day duties of the proposed program. They will primarily be responsible for updating program materials and coordinating the training for elementary school teachers, cafeteria staff and peer leaders during the school's intervention years. They will also assist in the monthly food taste tests at the intervention schools as well as formulate topics for the focus groups. The percent efforts for these three dieticians will vary with Mel Smith giving a twenty-five percent effort, Nancy Shiner giving a ten percent effort and Tara Ross giving a ten percent effort on the proposed program.

The Biostatistician for this project will be contractually hired from the University of Kentucky. The responsibilities of this position include survey review for statistical analysis, maintain and clean data, ensure data quality, and analyze and interpret data findings. The Biostatistician will work alongside the Program Director to produce reports for the funding agency, program stakeholders and partners. They will provide timely reports on the processes and outcomes of the proposed program.

The principals at each of the ten schools will be responsible for communicating with the entire research team regarding any issues of consent, concerns from parents as well as being a liaison for the proposed program. The principals will also aid in the promotion of the project within the school, reinforcing learned concepts at school-wide events and being a positive role model for students. The core class teachers for fourth and fifth grades at each of the schools will provide invaluable help to the research staff as well as disseminate the program curriculum. Other program staff include the cafeteria staff who will implement the food service portion of the program by encouraging healthy food choices and reinforcing the Go, Slow and Whoa food groups. Two graduate research assistants will give a fifty percent effort on this grant proposal with their main duty being to assist the project director and spearhead the photo analysis of food trays for outcome evaluations. The superintendent and various

staff from the participating schools will ensure a collaborative environment with the common goal to improve the nutrition choices of their students. Family Resource Center Coordinators will offer an invaluable partnership as they know the diverse background of the students being served in each school and will ensure the program's messages to be culturally diverse and inclusive to all.

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APPENDIX 1: BUDGET

	2020	2021	2022
A. Personnel	\$111,750	\$115,103	\$118,558
B. Fringe	\$38,271	\$39,418	\$40,600
C. Supplies	\$34,900	\$66,200	\$33,700
D. Travel	\$13,000	\$24,000	\$14,000
E. F & V budget for schools	\$25,000	\$50,000	\$25,000
F. Contractual Costs	\$40,000	\$65,000	\$40,000
G. Training/Incentive	\$20,000	\$40,000	\$20,000
H. Other	\$26,500	\$30,000	\$28,500
I. Facilities & Admin.	\$156,257	\$217,009	\$161,780
Total	\$465,678	\$646,730	\$482,138

Tentative Budget: Year 1

2020					
Personnel	Effort	Salary	Sub-Total	Fringe	Total
Program Coordinator/Financial Manager	15.00%	\$125,000	\$18,750	\$4,911	\$23,661
Program Director	75.00%	\$60,000	\$45,000	\$14,198	\$59,198
MPH GRA (up to 50%)	50.00%	\$30,000	\$15,000	\$6,278	\$21,278
MPH GRA (up to 50%)	50.00%	\$30,000	\$15,000	\$6,278	\$21,278
Dietician 1	25.00%	\$40,000	\$10,000	\$3,670	\$13,670
Dietician 2	10.00%	\$40,000	\$4,000	\$1,468	\$5,468
Dietician 3	10.00%	\$40,000	\$4,000	\$1,468	\$5,468
Contractual Costs					
Statistician					\$15,000
Core Teacher Group (n=10)		\$2,500/teacher			\$25,000
Supplies					
Digital Cameras					\$400
Laptops					\$2,000
Go, Slow & Whoa Signage (5 schools)					\$12,500
Printed Materials & Copy Costs for Classroom Lessons					\$20,000
Travel					
Teacher Retreat					\$5,000
Annual Project Director Meeting					\$3,000
Research/Training Incentives					
Focus Group					\$20,000
Teacher Training/Incentive					
Food Service Staff Training/Incentive					
Peer Leader Training					
Money for schools to purchase extra F & V (\$5,000 per school per semester)					\$25,000
Other					
Tuition for GRA (x2)					\$24,000
Total Direct Costs					\$309,420
Facilities & Administration					\$156,257
TOTAL					\$465,677

Tentative Budget: Year 2

2021					
Personnel	Effort	Salary		Fringe	Total
Program Coordinator/Financial Manager	15.00%	\$128,750	\$19,313	\$5,059	\$24,371
Program Director	75.00%	\$61,800	\$46,350	\$14,623	\$60,973
MPH GRA (up to 50%)	50.00%	\$30,900	\$15,450	\$6,466	\$21,916
MPH GRA (up to 50%)	50.00%	\$30,900	\$15,450	\$6,466	\$21,916
Dietician 1	25.00%	\$41,200	\$10,300	\$3,780	\$14,080
Dietician 2	10.00%	\$41,200	\$4,120	\$1,512	\$5,632
Dietician 3	10.00%	\$41,200	\$4,120	\$1,512	\$5,632
Contractual Costs					
Statistician					\$15,000
Core Teacher Groups (n=20)		\$2,500/teacher			\$50,000
Supplies					
Digital Cameras					\$200
Laptops					\$1,000
Go, Slow & Whoa Signage (5 schools)					\$25,000
Printed Materials & Copy Costs for Classroom Lessons					\$40,000
Travel					\$10,000
Teacher Retreat					\$5,000
Annual Project Director Meeting					\$3,000
Regional Training for 2 Staff Members					\$6,000
Research/Training Incentives:					\$40,000
Focus Group					
Teacher Training/Incentive					
Food Service Staff Training/Incentive					
Peer Leader Training					
Money for schools to purchase extra Fruits and Vegetables (5,000 per school per semester)					\$50,000
Other					\$5,000
Tuition for GRA (x2)					\$25,000
Total Direct Costs					\$429,720
Facilities & Administration					\$217,009
TOTAL					\$646,729

Budget Justification

The total budget for the proposed program over the course of three years is \$1,594,546.00. Majority of the budget goes toward research personnel, their fringe benefits and the indirect costs for facilities and administration. Supplies purchased for the grant include laptops, digital cameras, Go, Slow & Whoa signage as well as printing costs and materials for the classroom lessons. The travel portion of the budget accounts for an annual Project Director's meeting in Washington, D.C. as well as sending three staff members to an annual regional training in years two and three of the grant. Contractual costs include hiring a statistician and paying the core group of teachers for their input from the beginning of the grant through completion. Other costs include tuition reimbursement for the two graduate assistants and additional funds for training if the number of school staff changes over the course of the grant. Year two of the grant is more expensive because the program will be implemented in all ten schools in year two.

APPENDIX 2: LOGIC MODEL

Logic Model

Inputs	Outputs		Outcomes -- Impact		
	Activities	Participation	Short	Medium	Long
<ul style="list-style-type: none"> Funding Evidence Based Interventions Go, Slow & Woah Materials Community Advisory Group (CAG) Community and School Partnerships Digital Cameras Data Collection 	<ul style="list-style-type: none"> -Retreat for core teachers -Training for teachers, cafeteria staff, peer leaders and evaluators -Update and expand program materials (for grade level appropriateness and to make culturally diverse) -Incorporate program materials into existing curriculum -Monthly food challenges; new foods brought in monthly to taste -Change display of fresh fruit and vegetables in lunch line -Hang program materials in the cafeteria, hallways, school nurse office and family resource centers -Data Collection at beginning and end of each school year (2 school years total) 	<ul style="list-style-type: none"> 10 CEP Elementary Schools in Lexington, KY 4th & 5th Grade students Homeroom teachers Cafeteria Staff School Nurses Family Resource Center Directors LFCHD Dieticians (3) CAG members Peer Leaders 	<ul style="list-style-type: none"> -Increase fruit and vegetable consumption among students at participating schools -Increase willingness to try fruits and vegetables at school-provided meals -Increase access and availability to fruits and vegetables at school-provided meals -Increase 'likability' of fresh fruits and vegetables through new displays -Increase knowledge of the benefits of eating more fruits and vegetables 	<ul style="list-style-type: none"> Lower obesity rates among Elementary aged children Increase exposure to fresh fruits and vegetables in all Lexington Elementary schools Decreased absences at participating schools 	<ul style="list-style-type: none"> Reduce childhood obesity in Lexington, KY Increased consumption of fruits and vegetables lasts into adulthood Decreased rates of obesity-related chronic disease in adults

APPENDIX 3: GANTT CHART

GANTT CHART

Timeline of Program Activities

	2020				2021				2022			
	Jan, Feb, March	April, May, June	July, Aug, Sept	Oct, Nov, Dec	Jan, Feb, March	April, May, June	July, Aug, Sept	Oct, Nov, Dec	Jan, Feb, March	April, May, June	July, Aug, Sept	Oct, Nov, Dec
Planning phase												
Meet with stakeholders, principals, CAG												
Schools randomized to groups												
Select core group of 4th/5th grade teachers from participating schools												
Update educational materials/Finalize adaptations												
Training for cafeteria, teachers, peer leaders (Intervention schools)												
Peer leaders chosen												
Curriculum begins 2x per week during school months												
F & V display updated in cafeteria; program materials displayed throughout intervention schools												
New F & V of the month for sampling and eating at breakfast and lunch												
Photo Analysis of breakfast and lunch trays												
Process Evaluation												
Outcome Evaluation												
Dissemination of findings												

APPENDIX 4: The CATCH's Kids Club Questionnaire

<https://www.nhlbi.nih.gov/health/educational/wecan/downloads/CKC-questionnaire.pdf>