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A Study of Teacher Practices and Perspectives on Nutrition Education in Maine Elementary Schools

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A STUDY OF TEACHER PRACTICES AND PERSPECTIVES ON NUTRITION EDUCATION IN MAINE ELEMENTARY SCHOOLS

by

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ABSTRACT

The purpose of this study was to identify how multiple influencing factors on nutrition education, relating to professional development, teacher self-efficacy, teacher beliefs, program use, wellness policies, and environmental factors, influence the amount of time elementary educators spend teaching nutrition in their classrooms. The primary tool for data collection was a comprehensive survey developed using Qualtrics software. The survey was distributed to Maine superintendents and principals who were asked to pass the survey along to K-5 teachers. Out of 270 responses collected before the survey end date, 233 were used for statistical analyses. The factors that influenced time teaching nutrition for Maine elementary school teachers were teachers' beliefs surrounding nutrition education in schools, perceived administrative support for nutrition education, student body socioeconomic status, and training in nutrition education.

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INTRODUCTION

Teaching children at an early age how to adopt healthy eating habits through nutrition education is an important component of the work schools can do to combat childhood obesity.[1] According to the Centers for Disease Control and Prevention (CDC), childhood obesity has doubled over the past 30 years, and in 2012, nearly one-third of children in the United States were overweight or obese. Childhood obesity is a significant health concern, as it can lead to a variety of health issues in adulthood, such as diabetes, heart disease, bone and joint disorders, and cancer later in life.[2]

Children's health is influenced by their socioeconomic status and home environment, but because children spend the majority of their time at school, habits that lead to poor health may also be perpetuated by the school environment.[3] In fact, schools provide students with 19-50% of their daily food intake,[3] so school food options and availability can have a substantial impact on a child's diet and overall health.

Adequate nutrition education provided through schools has the potential to benefit student's health and eating habits. According to the National Center for Education Statistics on average, teachers provided around 13 hours per year of nutrition education in the late 1990s.[4] The reported average from over 20 years ago falls far below the recommended yearly amount of nutrition education of 50 hours, which is the amount needed to incite not just a greater knowledge of nutrition, but also behavior change surrounding nutritional habits.[5,6]

There are multiple factors that may affect the amount of time teachers spend educating their students about nutrition. These influencing factors include the availability of external nutrition programming, student body socioeconomic status, teacher

perspectives on nutrition education, resources available to teachers for implementing nutrition education, teacher self-efficacy, training opportunities for teachers regarding nutrition education, school wellness policies, and the school health environment.[7-27]

Although there is data available on the amount of nutrition education provided in schools in relation to multiple influencing factors, there is no data available on the state of nutrition education in Maine elementary schools. The purpose of this study is to determine how the multiple influencing factors of nutrition education, relating to professional development, student body socioeconomic status, teacher self-efficacy, teacher beliefs, program use, wellness policies, and environmental factors influence the amount of time Maine elementary educators spend teaching nutrition in their classrooms.

CHAPTER 1

LITERATURE REVIEW

1.1 Defining Nutrition Education

Isobel Contento, professor of Nutrition and Education and Columbia University, defines nutrition education as "any combination of educational strategies, accompanied by environmental supports, designed to facilitate voluntary adoption of food choices and other food and nutrition related behaviors conducive to health and well-being; nutrition education is delivered through multiple venues and involves activities at the individual, community, and policy levels."[6] There are many factors that affect the quality of and amount of exposure to nutrition education provided in elementary school settings. These influencing factors have been identified as the school student body socioeconomic status, nutrition education resource availability and acquisition, teacher self-efficacy and training, and administrative support.[7-27]

Because of the structure of most Maine elementary schools where a single teacher covers all subjects for the same classroom of students, Maine elementary teachers may be more likely to provide nutrition education in their classrooms in comparison to secondary school teachers. Secondary school teachers tend to be responsible for teaching specific subjects to multiple classes of students, and therefore nutrition education in Maine secondary schools may be more likely to be taught in health classes as a separate subject.[28]

Although nutrition is not currently included in the Common Core education standards, the Centers For Disease Control and Prevention developed the School Health Guidelines To Promote Healthy Eating And Physical Activity, which includes guidelines

for nutrition education.[29] Through these guidelines the CDC calls for school to provide comprehensive health education that focuses on improving knowledge and attitudes necessary for adopting and maintaining habits of healthy eating and physical activity. The CDC stresses the importance of nutrition education because it contributes greatly to students' abilities to choose healthy foods and to eat balanced diets over both short- and long-term timeframes.

In Maine, similar guidelines regarding nutrition education are outlined by the Maine Department of Education (DOE).[30] Through the Nutrition and Foodservice Guidelines, the Maine DOE recommends that schools include nutrition education as a part of the curriculum in coordination with school food service programs. The Maine DOE specifies that nutrition concepts should be taught to students of all ages, using United States Department of Agriculture (USDA) resources such as MyPlate, and parental participation in the educational process. These guidelines also specify that teachers who provide nutrition education should be provided with professional training in nutrition concepts and strategies for teaching nutrition.[30]

1.2 Nutrition Education Programs in Maine

In addition to direct delivery of nutrition education by classroom teachers, there are several national and local community nutrition education programs in Maine that seek to deliver nutrition education to the elementary school-aged target audience. There are a wide variety of nutrition education programs available to Maine schools. Some programs are exclusively available to schools where 50% of students are eligible for free or reduced-priced meals, such as the Eat Well Nutrition Program and Supplemental Nutrition Assistance Program Education (SNAP-Ed).[31,32] Some are available regionally,

while others make resources available to all schools, regardless of student body economic characteristics or location.

1.2.1 Maine SNAP-Ed

The Supplemental Nutrition Assistance Program (SNAP), which is funded through USDA Food and Nutrition Services (FNS), has specific programming to provide nutrition education to Americans who qualify for food assistance programs, called SNAP-Ed. Although SNAP-Ed serves all life stages, the program reaches children of low-income households through schools and communities where at least 50% of the students are eligible for free or reduced-priced meals. In Maine this program is currently implemented by the University of New England, providing nutrition education programming to students in school environments.[33] Maine SNAP-Ed implements nutrition programming in schools through the use of nutrition educators who have educational backgrounds in nutrition or public health, and use evidence-based curricula such as Pick A Better Snack, Nutrition To Grow On, and EatFit, as a part of their educational interventions.[34]

1.2.2 University of Maine Cooperative Extension's Eat Well Nutrition Education Program

The Expanded Food and Nutrition Program (EFNEP) is federally funded through the National Institute of Food and Agriculture (NIFA) under the USDA. EFNEP is implemented in Maine through the University of Maine's Cooperative Extension and is known as the Eat Well Nutrition Education Program and currently operates in eight counties in Maine.[31] Nationally, EFNEP is legislated to employ paraprofessional educators from the communities where the education is delivered. The paraprofessionals

are trained in a variety of skills, including how to deliver nutrition education consisting of basic nutrition concepts, shopping healthfully on a budget, planning and preparing meals, storing food, food safety, and physical activity.[35] Trained paraprofessionals teach these nutrition concepts to low-income adult community members and youth. In this way, nutrition educators learn skills they can utilize to save money and eat healthy while relating personally to the people they teach. In all states, EFNEP is implemented solely through Land Grant Institutions.[36]

1.2.3 Maine FoodCorps

FoodCorps is a national program partially grant-funded through AmeriCorps, making all FoodCorps volunteers AmeriCorps service members.[37] FoodCorps volunteers work in school settings to teach students about growing, preparing, and eating healthy foods so that they become more mindful about what they eat and where their food is coming from.[38] In Maine, The University of Maine is the host organization for the FoodCorps. Maine currently has 12 service members working statewide at Cooperative Extension county offices, schools, farms, and public health coalitions.[39]

1.2.4 Focus On Agriculture in Rural Maine Schools

Focus on Agriculture in Rural Maine Schools, otherwise known as F.A.R.M.S, is a Maine program based solely in Lincoln County. F.A.R.M.S educators in schools and at the F.A.R.M.S kitchen in Damariscotta teach students about healthy eating, cooking, and the role of local farms in providing healthy foods. Additionally, through establishing gardens at partner schools, F.A.R.M.S teaches students how to plant, care for, and harvest

vegetables.[40] The program is unique because their nutrition education is hands-on for students, providing a true "farm to school" experience for those involved.

1.2.5 Alliance for a Healthier Generation

Alliance for a Healthier Generation is a national organization that works in school settings, after-school programs, juvenile justice environments, businesses, and doctors' offices to teach American youth about healthy eating and physical activity. By providing schools with assessment tools to analyze their health programs and initiatives, Alliance can help schools develop action plans to guide each individual school toward their target health and wellness goals. When schools sign up to participate in Alliance for a Healthier Generation, they gain access to a resource database, rich with teaching materials, educational videos and websites, and nutrition curricula. Schools are also granted access to training materials for school health leaders to learn new strategies and ideas for improving the overall health of their schools. Although Alliance is not state funded or supported, there are about 300 schools in Maine that partner with Alliance, serving over 100,000 Maine students.[41]

1.2.6 Team Nutrition

Team Nutrition is a national program funded through the USDA FNS. Team Nutrition works to improve students' health by providing training to child nutrition professionals, increasing nutrition education for children, and by supporting schools in developing health-positive environments.[42] Team Nutrition provides nutrition education through food service programs, classroom and childcare activities, school-wide activities, community events, and social media. Only schools that participate in the National School

Lunch Program can apply to be Team Nutrition Schools, and in Maine, Team Nutrition is implemented through the Maine Department of Education Child Nutrition Services.[42]

1.2.7 Fuel Up to Play 60

Fuel Up to Play 60 is implemented by the National Dairy Council. In Maine this program is implemented through the Maine Dairy and Nutrition Council. The program is free for schools to participate in and is not limited to low-income schools. Fuel Up to Play 60 provides funding for schools to enhance their nutrition and physical activity initiatives and to get staff, students, parents, and the community involved in the movement. Schools can apply for educational grants for up to $4000, and since Fuel Up To Play 60 was established in 2011, 97 school-based projects in Maine have received funding.[43] There are over 73,000 schools nationwide that participate in this programming,[44] including 530 Maine schools.[43]

1.2.8 Let's Go! 5-2-1-0

Let's Go! 5-2-1-0 is a Maine obesity prevention program of the Barbara Bush Children's Hospital at Maine Medical Center. Let's Go! 5-2-1-0 not only works with schools, but has also been adopted by hundreds of businesses, community programs, and healthcare providers across Maine. There are 214 Maine schools that utilize Let's Go! 5-2-1-0 programming, making up 28% of their total outreach.[45] This programming is provided in the form of toolkits, specific to each program environment, which detail steps for implementing the health education with a focus on creating health-positive school, work and home environments.[46]

1.3 Nutrition Education Methods and Resources

Elementary school teachers provide nutrition education to their students using a variety of methods and resources.[7-12] These methods are grounded in behavior change theory so that lessons can be structured to target and incite specific behavior changes in relation to healthy eating.[7] If nutrition education methods are not grounded in behavior change theory, instead primarily focusing on relaying nutrition information, the education will not be as effective.[7] In order to provide the type of dynamic education Contento describes, teachers should utilize a variety of tools, such as classroom discussions, collaborative group work, lectures, taste-testing parties, snack preparation, worksheets, magazines, and curriculum guides.[8-11] The use of a variety of teaching methods and materials indicates that there are a variety of ways to teach nutrition to students. Teachers tend to use multiple types of resources available to them.

Teachers may be more likely to combine teaching nutrition concepts with other subjects in order to save classroom time. In a statewide Minnesota needs assessment about perceptions and practices of teachers surrounding nutrition education, Stang and colleagues found that 56% of teachers used a combination of teaching nutrition as a separate, discrete subject and integrating nutrition concepts into other subjects.[12] Twenty percent of teachers in this study, however, only integrated nutrition into other subjects, and 23% of teachers solely taught nutrition as a separate subject.[12] Findings from this study mirror results from other research. For example, in a study on teacher-led nutrition education in New York state, Watts and colleagues found that 28% of teachers taught nutrition as a separate subject and 62% of teachers integrated nutrition into science lessons.[8] In total, results from multiple surveys on teacher perspectives and practices on

nutrition education, results for teachers integrating nutrition into other subjects ranged from 30-72%, with science and health predominating as the subjects most frequently used to teach nutrition.[8,10-12]

Elementary educators occasionally have the option of teaching nutrition to students themselves or using a community educator to teach nutrition. Programs that provide nutrition educators to teach in schools in Maine include EFNEP, SNAP-Ed, and F.A.R.M.S. Stang and colleagues found that teachers were more likely to use community nutrition educators provided through external nutrition education programs than to seek out help in planning nutrition education lesson and activities.[12] In an evaluation of the Integrated Nutrition Project, an elementary school-based nutrition education program that focused on increasing students consumption of fresh fruits and vegetables and whole grains, Auld and colleagues describe how schools participating in the Integrated Nutrition Project used "Special Resources Teachers" (SRTs) in tandem with Public Health Nutritionists (PHNs) to provide nutrition education to students.[13] SRTs are professionals who have experience in classroom teaching and hands-on activity development. In the Integrated Nutrition Project, SRTs were used to alleviate time constraints for teaching and planning lessons and barriers around nutrition knowledge base from primary classroom teachers.[13] Auld and colleagues found that although this method of nutrition education was costly and difficult to maintain, teachers who previously had SRTs teach nutrition in their classrooms were more likely to provide nutrition education after the SRT-facilitated programming had ended.[13]

With nutrition education, teachers also make attempts to include parents in the educational process. Stang and colleagues found that 45% of teachers surveyed reported

that they tried to involve parents in the nutrition education process, however only three percent of those teachers reported that parents actually participated and expressed interest in helping with nutrition education.[12] It is clear that parental involvement in nutrition education is difficult to garner. However, schools with well-developed nutrition programming tend to have more parent involvement and awareness of the school's nutrition education programming.[9] In a process evaluation of the Team Nutrition pilot implementation, Levine and colleagues found that a strong Team Nutrition program, which included reaching out to parents through school and community events, take-home materials, and the media, over 90% of parents stated that they knew about Team Nutrition activities their children were participating in.[9]

1.4 The Teachers' Perspectives on Nutrition Education

Overall, elementary school teachers believe that nutrition education should be included in their school's curriculum and that their role in providing nutrition education is critical, as teachers are often looked to as role models for students.[10,12,14-16] The Theory of Reasoned Action assumes that behaviors are the result of behavioral intentions, the intention to perform a certain behavior, which results directly from a person's belief that performing the specific behavior will yield a specific result.[17] For teachers, before dedicating time and energy into teaching specific subjects, they must believe that the subject is important and of value to their students. Recent and older studies both illustrate that the value teachers place on nutrition education has not changed. Researchers have discovered that 93 to 98% of teachers agree that nutrition education should be a part of elementary school curriculum.[10,12,15,16] For example, in a qualitative study about teacher perspectives regarding nutrition education, Hall and colleagues found that teachers

thought that it was important that nutrition education was taught to young students because of the impact it could have on their future health.[14] Teachers agreed that it was important for the foundations of health to be built at a young age so that students could make healthier choices later in life. Additionally, teachers surveyed felt responsible for providing this education to their students.[14]

1.5 Nutrition Education Self-Efficacy and Teacher Training

Elementary teachers may be more likely to provide nutrition education in their classrooms if they are confident in their knowledge of nutrition and have received some form of training for teaching nutrition. According to Bandura, self-efficacy is defined as, "people's belief about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives".[18] Self-efficacy beliefs determine how people feel, think, motivate themselves and behave. In a survey-based analysis of teacher training, time spent teaching nutrition, and self-efficacy in nutrition, Britten and Lai hypothesized that teacher training in nutrition will only affect time spent teaching nutrition if training focuses on increasing teacher self-efficacy in nutrition.[19] Britten and Lai's findings supported their hypothesis. Teachers surveyed had greater reported self-efficacy with increased knowledge of nutritional concepts, and time teaching nutrition was affected by both self-efficacy and amount of training.[19] Britten and Lai concluded that improving teacher self-efficacy must be the focus of professional development in nutrition education for training to affect the amount of time educators spend teaching nutrition.[19] Similarly, in an assessment of nutrition education in Ohio elementary schools, Norton and colleagues found that teachers surveyed were more likely to teach nutrition in their classrooms if they had some professional training in teaching nutrition, had taught

nutrition before, or had access to materials to plan and execute nutrition lessons.[11] This indicates that teachers who had training or previous experience in nutrition education may have had greater self-efficacy for teaching nutrition, leading them to teach nutrition more frequently.

According to past research, self-efficacy may have an exceptional impact on how much time educators spend teaching nutrition.[10,16,19,20] This statement is supported by the findings of Brenowitz and Tuttle, who developed and tested a Nutrition-Teaching Self-Efficacy Scale (NTSES).[20] More specifically, in testing the NTSES, the researchers found that higher levels of self-efficacy were correlated with greater time spent teaching nutrition. Outcomes from the NTSES indicated that teachers who taught more than 11 hours of nutrition during the school year scored higher on the self-efficacy subscale than teachers who taught fewer than 10 hours of nutrition.[20] Like Britten and Lai, Brenowitz concluded that professional development for teachers in regards to nutrition education should focus on increasing teacher self-efficacy rather than simply providing training on nutrition content.[19,20]

1.6 Dose of Nutrition Education

The amount of nutrition education elementary school teachers provide to their students may vary depending on the school's student body socioeconomic status and resource availability, but overall, even teachers who provide comparatively high doses of nutrition education fall far below USDA and Academy of Nutrition and Dietetics (AND) recommendations. The AND recommends that students receive 50 or more hours of nutrition education over the course of the year, in order to adequately facilitate behavior change.[21] However, a 2000 survey through the United States Department of Education

found that on average, elementary school teachers spent only around 13 hours each year teaching nutrition.[21] Over the past twenty years, studies commonly found that the vast majority of teachers taught nutrition in their classrooms, but only a small percentage of teachers taught more than 10 hours of nutrition in a given school year.[10-12,20] In a needs assessment for teaching nutrition education in a Connecticut urban school district, Perez-Escamilla and colleagues, 56% of teachers surveyed reported teaching some nutrition, and out of the teachers who taught nutrition, 11% taught for an hour or less each year, and the majority of teachers reported teaching between two and fifteen hours per year.[10] Similarly, Brenowitz and Tuttle found that 67.5% of teachers surveyed taught some nutrition, but the majority of those who taught nutrition reported teaching less than 10 hours of nutrition per year.[20] For Stang and colleagues, 79% of teachers reported teaching some nutrition, but 83.6% of those who taught nutrition, taught less than 15 hours per year.[12] Lastly, Norton and colleagues found that 82% of teachers surveyed reported teaching some nutrition, but 51% of those who taught nutrition taught less than 10 hours per year, and 67% of these respondents only taught nutrition during one quarter of the school year.[11]

According to Contento, the amount of nutrition education necessary to change someone's knowledge level is 15 hours, but in order to cause changes in behavior students need to be exposed to 50 hours or more of nutrition education.[7,8] It is clear that even teachers who provide comparatively high amounts of nutrition education may not be teaching enough in their classrooms to affect short- and/or long-term behavior change.

1.7 School Wellness Policies in Relation to Nutrition Education

Wellness policies have been examined as potential paths to increasing the amount of nutrition education taught in elementary schools. In 2004, and again in 2010, Congress passed the Child Nutrition and Women, Infants, and Children (WIC) Reauthorization Act, which required schools participating in the National School Lunch Program (NSLP), administered through the USDA, to develop and enforce school wellness policies.[8,21] Wellness policies must include goals for nutrition education, physical activity, and school-based wellness activities.[8,21] The state of Maine works to reinforce the national standards for school wellness policies by providing policy assessment tools and development guidelines for public school educators.[22]

Briggs and colleagues suggest that school wellness policies provide opportunities for schools to assess and identify comprehensive school health needs.[21] This means that wellness policies not only address nutrition education, but should provide guidelines for all school-health related topics, such as quality of school lunches, health services for students, and physical activity initiatives. These policies, however, cannot be useful to schools unless they are well developed, fully implemented, are referenced and updated frequently, and are communicated to all school faculty and staff.[8] Having the administrative support in place to reinforce wellness policies is crucial for policies to have any influence over the amount of nutrition education teachers provide.

Another barrier to wellness policies influencing teacher practices and perspectives surrounding nutrition education is the possibility that teachers may not believe that it is their role to inforce the policies or provide nutrition education.[16] In a survey-based study to determine the practices and perceptions of all elementary school staff members in

regard to nutrition education, Lambert and Carr found that from the teachers surveyed, the majority did not believe that it was the teacher's role to enforce school wellness policy guidelines.[16] Additionally, only 19.4% of teachers agreed that school wellness policies have an effect on increasing nutrition competencies in lesson plans.[16]

Although past research has found wellness policies to be relatively ineffective at increasing the amount of nutrition education provided in elementary schools, guidelines on nutrition education are included in school wellness policies as required by federal law.[3,23] In a national review of school wellness policies, Moag-Stahlberg and colleagues found that specific guidelines for classroom nutrition education were included in 79% of policies assessed. Additionally, 43% of policies assessed included goals for teacher training and professional development for nutrition education.[23]

Lastly, researchers found that teachers will provide nutrition education to students without the presence or knowledge of school wellness policies.[12] Stang and colleagues conducted a statewide needs assessment in Minnesota of teacher practices and perspectives surrounding nutrition education. Stang and colleagues found that there were many teachers who provided nutrition education to their students, even if it was not required by their school.[12] These results indicate that teachers felt teaching nutrition was an important part of their job, regardless of its presence in school wellness policies.[12]

1.8 Barriers to Nutrition Education Programming

Researchers have found that the barriers elementary school teachers face when providing nutrition education are synonymous, regardless of location or grade level taught.[12] In a Minnesota assessment of teacher practices and perceptions surrounding nutrition education, Stang and colleagues found that the lack of classroom, professional

development opportunities, and educational materials were the three greatest barriers to providing nutrition education to students.[12] These results were concurrent with other studies. In an assessment of the Team Nutrition Pilot Program, Levine and colleagues found that teachers often cited a lack of training resources and lesson planning and implementation time as the greatest barriers to providing nutrition education.[9] In a needs assessment of nutrition education in Connecticut, Perez-Escamilla also found that even though teachers were highly interested in teaching nutrition, they lacked the time and resources to do so,[10] and in a similar assessment done in Arkansas and Idaho, Lambert and Carr found that teachers did not believe that they had enough class time to include nutrition competencies in the curriculum.[16] Finally, in an assessment of a school nutrition program using Special Resource Teachers, Auld and colleagues found that the greatest barriers teachers faced when it came to providing nutrition education were time, money for teaching materials, equipment, and a lack of additional staff to help present lessons.[13]

Other barriers to providing nutrition education cited by elementary educators included not having access to useful curriculum materials,[8] not having enough administrative support,[8] a lack of national nutrition education guidelines that can be used to develop lessons and activities,[21] and the perceived lack of resources by teachers, even if resources were available.[11,13]

1.9 The Impact of Health Positive Environments on Nutrition Education

Health positive environments in schools may help to strengthen nutrition education efforts and encourage students to make more nutritious choices. Especially in children ages six to eleven, eating habits are increasingly impacted by environmental factors outside the home.[3] Because school meals can make up anywhere between 19 to

50% of students' total daily calorie intake[3], making the food provided by schools and the environments in which students eat critically important to children's food choices.

School health environments can also vary depending on the average socioeconomic status of students attending the school[25]. In an assessment of the relationship between school socioeconomic variances, school food and beverage environment, and state competitive food laws, Taber and colleagues found that schools in areas of high-socioeconomic status tended to sell greater quantities of healthy and non-healthy items than schools in low-socioeconomic areas.[25] This means that students in schools of low socioeconomic status had less food and diversity of food choices available to them. Additionally, although school food laws were effective in low-income schools, schools with strict food laws in place to limit the availability of unhealthy foods did not necessarily have increases in healthy food choices available.[25]

CHAPTER 2

METHODS

2.1 Institutional Approval

The University of Maine Institutional Review Board (IRB) for the Protection of Human Subjects approved this research project as exempt from further review in July 2016. Multiple revisions were made to the research proposal until the survey questions and data collection methods ensured participant confidentiality.

2.2 Survey Instrument

The survey was created and distributed using Qualtrics software. The survey consisted of 26 questions used to evaluate the factors influencing the amount of time teachers spent educating their students on nutrition competencies. The survey questions were designed to gather data based on seven content areas: 1) collaboration with external nutrition education programs, 2) nutrition education resources and methods, 3) teacher perspectives on nutrition education, 4) self-efficacy and professional training, 5) school wellness policies, 6) environmental factors, and 7) barriers to nutrition education. Basic demographic information was collected as well, so that factors such as socioeconomic status, grade level taught and years of elementary teaching experience could be compared to the seven content areas.

The survey tool for this research was developed based upon past research using similar surveys which assessed teachers' practices and perspectives on nutrition education. Survey questions were adapted from the Nutrition Education Practices Survey For Teachers and Foodservice Directors (NEP)[9], and the Nutrition Teaching Self-

Efficacy Scale developed by Brenowitz and Tuttle.[13] Survey questions were also adapted from survey-based research topics and conclusions from a variety of studies.[3,8-26] Prior to full dissemination, the survey was piloted with a convenience sample of 10 local elementary teachers in July of 2016. Feedback from the pilot survey population was used to make final edits to the survey instrument.

Table 2.1 Survey Questions and Question Categories

Topic	Survey Questions	Response Type
Demographic Information	What grade level do you teach?[10-12,16,20] - Kindergarten - First grade - Second grade - Third grade - Fourth grade - Fifth grade	Multiple Choice
	How many years have you been teaching elementary education?[11,12,20] - Less than 5 - 5-10 - 11-15 - 16-20 - Greater than 20	Multiple Choice, multiple responses allowed
	What is the name of the school you currently teach at?	Open Answer
	What is the town/city in which you currently teach?	Open Answer
External Program Collaboration	Does your school collaborate with any of the programs listed below?[10] - My school does not collaborate with external nutrition education	Multiple Choice, multiple responses allowed

Topic	Survey Questions	Response Type
	programs - Maine SNAP-Ed Program - Cooperative Extension's Eat Well Program - Maine FoodCorps - F.A.R.M.S - Alliance For A Healthier Generation - Team Nutrition - Fuel Up To Play 60 - Let's Go 5-2-1-0 - Other - Not Sure	
	What is/was the form of collaboration between your school and the nutrition education program? - Nutrition educator from program teaches in school classrooms - Program provides teachers with resources or teaching materials - A combination of the above - Not sure	Multiple Choice
	This past school year (2015-2016), estimate the amount of time a nutrition educator from a community program taught nutrition education in your classroom?[13]	Sliding Bar - 0 to 30
	What support, materials, or training did you receive from an external program or organization for educating your students about nutrition?[11]	Multiple Choice, multiple responses allowed

Topic	Survey Questions	Response Type
	- Staff training and education - Worksheets, handouts, activities, etc. - Manual, guide, or textbook - Online resources - None of the above - Other:_____	
	If you have received in-person training from an external nutrition education program or organization, how many hours of training have you received in the past year? - 1 hour per year - 2 hours per year - 3 hours per year - 4 hours per year - over 4 hours per year	Multiple choice
Nutrition Education Resources and Methods	What resources do you utilize to help you develop and teach nutrition in your classroom?[8,9] - Worksheets - Handouts - In-person staff training - Online staff training resources (websites, videos, or manuals) - Physical textbooks, curricula, or manuals - Newsletters, magazines, or pamphlets - Manipulative or laboratory materials - Computer software - Audio and visual aids (films, videotapes, or	Likert-type rating scale for each option - Not at all - Small extent - Moderate extent - Great extent

Topic	Survey Questions	Response Type
	posters) - Other: _____	
	To what extent do you use the following teaching strategies for nutrition lessons?[8,11,26] - Active discussion - Collaborative or cooperative work - Computers or other advanced technology - Demonstrations - Field trips - Guest speakers - Hands-on learning - Lecturing - Media presentations - Role playing - Special events (e.g., fairs, plays) - Student projects - Team teaching - School gardens - Other:_____	Likert-type rating scale for each option - Not at all - Small extent - Moderate extent - Great extent
	Do you integrate nutrition education into other subject areas? If so, to what extent do you integrate lessons about nutrition into the following subjects?[8,11,12] - Health and physical education - History and social studies - Math - Reading and language arts - Science - Other: _____	Likert-type rating scale for each option - Not at all - Small extent - Moderate extent - Great extent

Topic	Survey Questions	Response Type
	Do you make active attempts to involve parents in the nutrition education process?[9,12,16]	Likert-type rating scale - Not at all - Small extent - Moderate extent - Great extent
	What resources do you use in order to learn more about nutrition?[16,19] - MyPlate or Nutrition.gov online resources - Magazines - Blogs and websites - Nutrition textbooks - Learning materials provided by a nutrition education program - Other, please specify:___	Likert-type rating scale for each option - Not at all - Small extent - Moderate extent - Great extent
	Do you feel that resources are available to you through your school for educating their students about nutrition?[11,16]	Likert-type rating scale - Not at all - Small extent - Moderate extent - Great extent
The Teachers' Perspective on Nutrition Education	Do you agree that nutrition education should be a part of elementary school curriculum?[14,16,19]	Likert-type rating scale - Not at all - Small extent - Moderate extent - Great extent
	Do you believe that it is the teacher's role and responsibility to provide nutrition education to students?[10,11,16,19]	Likert-type rating scale - Not at all - Small extent - Moderate extent - Great extent
	Do you feel that your school's administration is encouraging and supportive of nutrition education in the classroom setting?[16]	Likert-type rating scale - Not at all - Small extent - Moderate extent

Topic	Survey Questions	Response Type
		- Great extent
Self-Efficacy and Training	How confident are you in your knowledge of nutrition?[10,16,19,20]	Likert-type rating scale - Very confident - Somewhat confident - Neutral - Somewhat not confident - Not confident
	Have you received staff training from your school that addresses nutrition education?[9,11-13,16,19,20]	Multiple choice - Yes - No
	How many hours of training have you received in the past year?[19] - 1 hour - 2 hours - 3 hours - 4 hours - Over 4 hours	Multiple choice
	If you have received in-person training from an external nutrition education program or organization, how many hours of training have you received in the past year? - 1 hour - 2 hours - 3 hours - 4 hours - Over 4 hours	Multiple choice
	What do you think would help you to improve your confidence in your knowledge of and ability to teach nutrition?[14]	Open answer

Topic	Survey Questions	Response Type
Dose of Nutrition Education	This past school year (2015-2016), estimate the number of hours you provided direct nutrition education to your students.[8,11,12,16,19,26,27]	Sliding bar - 0 to 30
	This past school year (2015-2016), estimate the number of hours that a nutrition educator from a community program provided nutrition education to your students.[9,11]	Sliding bar - 0 to 30
School Wellness Policies	Do you have the following policies readily available to you at your school?[23,24] - School or district wellness policy - Healthy Fundraising Policy - Healthy school celebration policy - Healthy snack policy - Other, please specify:_____	Multiple choice for each option - Yes - No - Unsure
Barriers to Nutrition Education	What barriers have you encountered that have made it difficult to teach nutrition to your students?[9,10,12,14]	Open answer

Topic	Survey Questions	Response Type
School Health Environment	In what ways and to what extent is your school environment supportive or conducive to making healthy choices, including eating nutritiously?[3,25] - Providing healthy options, such as a salad bar, for all students at lunch time. - Positive health advertisements in hallways and classrooms. - Time set aside for snack time with enforced rules on bringing healthy snacks. - 20-30 minutes set aside for physical activity during the school day. - Processed-snack-food vending machines. - Soda or sugar-sweetened beverage vending machines. - Other environmental factors:_____	Likert-type rating scale for each option - Not at all - Small extent - Moderate extent - Great extent

2.3 Data Collection

A contact list of 149 Maine superintendents was compiled from superintendent contact information available on the Maine School Superintendents Association website. Surveys were distributed to superintendents via Qualtrics using an email detailing the goals and objectives of the study on September 14, 2016. Superintendents were asked to distribute the survey to two elementary school teachers from each grade level K-5, or to school principals, who could then distribute the survey to the requested population of

elementary teachers. After two weeks, the survey was then distributed to 245 school principals whose teachers had not yet completed the survey. The survey was re-sent to all school principals in a final email noting that the survey participation time period would end in five days. The survey was never distributed directly to teachers due to the administrative hierarchy of school systems and the ease of sending the survey to administrators, rather than teachers. In total, 270 responses were collected by the survey end date of October 14, 2016.

Participants were eligible to take the survey if they were a Maine elementary school teacher, educating in grades kindergarten through fifth grade. After survey completion participants were given the opportunity to provide their contact information in order to be entered in a drawing for one of eight $25 Walmart gift cards. Winners were chosen at random from the list of teachers who provided contact information using a true random number generator from random.org.

2.4 Statistical Analysis

Survey data was downloaded from Qualtrics into Excel software for data cleaning and preliminary analysis. The data was cleaned by removing 42 of the 270 records which were coded as incomplete by Qualtrics. Survey responses were marked as complete if contact information was provided after survey completion. Because survey respondents did not have to complete all questions to finish the survey, some respondents may have skipped questions, leading to a lower response rate for certain questions, even though Qualtrics coded their survey responses as complete.

For further analysis, each possible response for survey items were assigned numerical values. For example, response options for Likert-type scale questions were coded as: not at all = 0, small extent = 1, moderate extent = 2, and great extent = 4.

All single-question statistical analyses were completed by the statistician using SAS 9.4. Cross-analyses of questions were completed using IBM SPSS Statistics (version 24) and Microsoft Excel (15.24). One-way analysis of variance (ANOVA) and consecutive post hoc analyses were conducted using SPSS in order to test for significant differences in time teachers spent providing nutrition education in relation to multiple influencing factors.

Unpaired, two-tailed t-tests were conducted using Excel to test for statistically significant differences in the amount of time teachers spent providing nutrition education in relation to binary response-type questions.

A word cloud was used for open-response-type questions to distinguish similarities between written responses.

CHAPTER 3

RESULTS

3.1 Survey Respondent Demographics

Table 3.1. Distribution of grade levels taught by participants.

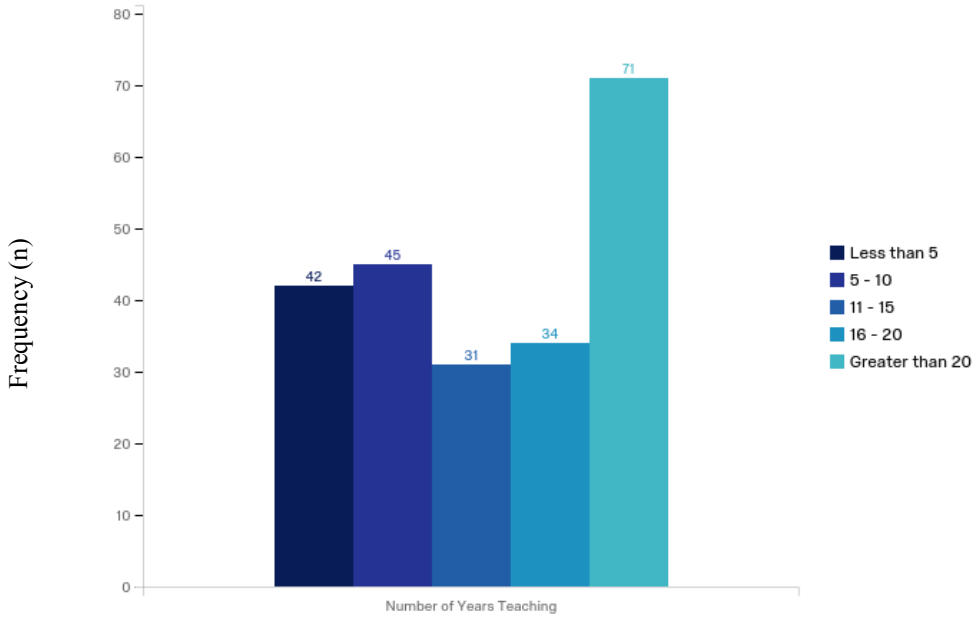
Recoded Responses with Frequencies		
Grade	**Frequency**	**Percent**
KG	54	23.68
1	51	22.37
2	54	23.68
3	43	18.86
4	50	21.93
5	39	17.11
No response	13	5.70
Total	304	

NOTE: Some participants (n=31) taught multiple grades, therefore the total frequency is greater than the sample size.

Of those participants who provided a grade level, 23.68% (n=54) taught kindergarten, 22.37% (n=51) taught first grade, 23.68% (n=54) taught second grade, 18.86% (n=43) taught third grade, 21.93% (n=50) taught fourth grade, and 17.11% (n=39) taught fifth grade (table 3.1). Thirteen participants did not provide a grade level.

To account for the 31 teachers who taught multiple grade levels, binary-coded fields for each grade level were created. This made it so that participants who taught multiple grade levels, even though they only responded to the survey once, were statistically representative of each grade level they taught for the preliminary analysis on distribution of grade levels taught (Table 3.1).

Figure 3.1. Distribution of number of years participants have taught elementary school.



Number of years teaching elementary school

Of the participants who provided a response for the number of years they had been teaching elementary school, n=42 (18.83%) had been teaching for less than 5 years, n=45 (20.18%) had taught between 5 and 10 years, n=31 (13.90%) had taught between 11 and 15 years, n=34 (15.25%) had taught between 16 and 20 years, and n=71 (31.84%) had taught elementary school for greater than 20 years (Figure 3.1).

Figure 3.2. Distribution of participant school's student eligibility for free and reduced priced lunch.

Out of the 228 complete surveys, 219 respondents entered a response for the name of the school at which they taught. From this, state statistics for student body free and reduced price meals eligibility were calculated. In total 59% (n=130) of schools where respondents taught had 50% or more students who were eligible for free or reduced price meals. The remaining 41% (n=89) of school where respondents taught had fewer than 50% of students eligible for free or reduced price meals.

Statewide, 54.4% (n=339) of K-12 public schools have greater than 50% of their students eligible for free or reduced price meals. The remaining 45.6% (n=284) K-12 public schools in Maine have fewer than 50% of their students eligible for free or reduced price meals (Figure 3.2).

3.2 External Program Collaboration

Table 3.2. Does your school collaborate with any of the programs listed below? Choose all that apply:

External Nutrition Education Programs	Frequency (n)	Percent
My school does not collaborate with external nutrition education programs	10	4.48
Maine SNAP-Ed Program	39	17.49
Cooperative Extensions Eat Well Program	13	5.83
Maine FoodCorps	11	4.93
F.A.R.M.S.	2	0.90
Alliance for a Healthier Generation	1	0.45
Team Nutrition	3	1.35
Fuel Up to Play 60	14	6.28
Let's Go! 5-2-1-0	104	46.64
I am unsure which program(s) are used; I am unsure if there is collaboration	87	39.01
Other	39	17.49
Total	323	

For this question respondents had the option of choosing multiple programs. The most-used program was Let's Go 5-2-1-0! with 46.64% (n=104) of respondents affirming its use. Thrity-nine percent (n=87) of respondents, though, replied that they were unsure which programs their school collaborates with, or were unsure if there was any collaboration (Table 3.2).

Table 3.3. Form of collaboration between school and external nutrition education program.

What is/was the form of collaboration between your school and the nutrition education program?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent

What is/was the form of collaboration between your school and the nutrition education program?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
No Response	10	4.48	10	4.48
Nutrition educator from program teaches in school classrooms	41	18.39	51	22.87
Program provides teachers with resources or teaching materials	36	16.14	87	39.01
A combination of the above options	40	17.94	127	56.95
I am unsure	96	43.05	223	100.00
Total	223			

Of the responses provided for the form of collaboration schools had with any external nutrition education programs, 43.05% (n=96) of respondents were unsure about the form of collaboration between their school and the nutrition education program (Table 3.3).

Table 3.4. Support, materials, and training from external nutrition education program teachers use for educating students about nutrition.

What support, materials, or training have you received from an external nutrition education program or organization for educating your students about nutrition?	Frequency (n)	Percent
No response	71	31.84

What support, materials, or training have you received from an external nutrition education program or organization for educating your students about nutrition?	Frequency (n)	Percent
Staff training and education	39	17.49
Worksheets, handouts, activities, etc.	88	39.46
Manual, guide, or textbook	43	19.28
Online resources	64	28.7
None of the above	0	0
Other	15	6.73
Total	320	

Approximately 39% (n=88) of respondents reported receiving worksheets, handouts, and activities from external nutrition education programs for educating their students about nutrition. Another 28.7% (n=64) reported receiving online resources for external nutrition education programs for educating students about nutrition. These were the most commonly provided resources from external nutrition education programs (Table 3.4).

Table 3.5. Distribution of number of hours for professional training in nutrition education from external nutrition education programs.

If you have received in-person training from an external nutrition education program or organization, how many hours of training have you received in the past year?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
No response	199	89.24	199	89.24

If you have received in-person training from an external nutrition education program or organization, how many hours of training have you received in the past year?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
1 hour	15	6.73	214	95.96
2 hours	5	2.24	219	98.21
3 hours	1	0.45	220	98.65
4 hours	1	0.45	221	99.10
More than 4 hours	2	0.90	223	100
Total	223			

Of the 17.49% (n=39) of respondents who reported receiving staff training and education from external nutrition education programs, 38.46% (n=15) reported receiving only 1 hour of training. Out of the total population of survey respondents, this means that 6.73% (n=15) had received 1 hour of training in nutrition education from an external nutrition education program, and that only 4% (n=9) of respondents had received more than 1 hour of training from an external nutrition education program (Table 3.5).

3.3 Resources and Methods

Table 3.6. What resources do you utilize to help you develop and teach nutrition education lessons in your classroom? Check all that apply:

Resources	Blank	Not at all		Small extent	
	n	Percent	n	Percent	n
Worksheets	75	29.05%	43	53.38%	79
Handouts	78	22.76%	33	57.24%	83
In-person staff training	91	62.12%	82	23.48%	31
Online staff training resources (websites, videos, or manuals)	90	54.14%	72	34.59%	46
Physical textbooks, curricula, or manuals	88	64.44%	87	25.19%	34
Newsletters, magazines, or pamphlets	79	36.81%	53	50.00%	72
Manipulative or laboratory materials	89	61.94%	83	22.39%	30
Computer software	89	67.91%	91	24.63%	33
Audio and visual aids (films, videotapes, or posters)	74	32.21%	48	49.66%	74
Other	193	50.00%	15	3.33%	1

Table 3.6. Continued.

List of Resources	Moderate extent	Great extent	Total

	Percent	n	Percent	n	
Worksheets	16.22%	24	1.35%	2	148
Handouts	17.24%	25	2.76%	4	145
In-person staff training	9.85%	13	4.55%	6	132
Online staff training resources (websites, videos, or manuals)	9.77%	13	1.50%	2	133
Physical textbooks, curricula, or manuals	8.89%	12	1.48%	2	135
Newsletters, magazines, or pamphlets	13.19%	19	0.00%	0	144
Manipulative or laboratory materials	12.69%	17	2.99%	4	134
Computer software	5.97%	8	1.49%	2	134
Audio and visual aids (films, videotapes, or posters)	14.77%	22	3.36%	5	149
Other	20.00%	6	26.67%	8	30

The resources used least by teachers to develop and teach nutrition education lessons included computer software, manipulative or laboratory materials, textbooks, curricula, and manuals, and in-person staff training. There were no resources that stood out as the most-used resources (Table 3.6).

Table 3.7. To what extent do you use the following teaching strategies for nutrition lessons?

Teaching Strategies	Blank	Not at all	Small extent

	n	Percentage	n	Percentage	n
Active discussion	61	3.70%	6	33.33%	54
Collaborative or cooperative work	82	31.21%	44	31.91%	45
Computers or other advanced technology	80	48.95%	70	38.46%	55
Demonstrations	80	33.57%	48	40.56%	58
Field trips	87	69.85%	95	24.26%	33
Guest speakers	82	51.77%	73	30.50%	43
Hands-on learning	77	28.77%	42	39.04%	57
Lecturing	83	40.71%	57	48.57%	68
Media presentations	83	50.71%	71	37.86%	53
Role playing	88	60.74%	82	30.37%	41
Special events (e.g., fairs, plays)	85	65.94%	91	25.36%	35
Student projects	85	62.32%	86	30.43%	42
Team teaching	86	78.83%	108	15.33%	21
School gardens	74	47.65%	71	34.90%	52
Other strategies	198	80.00%	20	8.00%	2

Table 3.7. Continued.

Teaching Strategies	Moderate extent		Great extent		Total
	Percentage	n	Percentage	n	

Active discussion	38.89%	63	24.07%	39	162
Collaborative or cooperative work	31.21%	44	5.67%	8	141
Computers or other advanced technology	10.49%	15	2.10%	3	143
Demonstrations	19.58%	28	6.29%	9	143
Field trips	5.15%	7	0.74%	1	136
Guest speakers	14.89%	21	2.84%	4	141
Hands-on learning	23.97%	35	8.22%	12	146
Lecturing	9.29%	13	1.43%	2	140
Media presentations	8.57%	12	2.86%	4	140
Role playing	8.89%	12	0.00%	0	135
Special events (e.g., fairs, plays)	7.25%	10	1.45%	2	138
Student projects	6.52%	9	0.72%	1	138
Team teaching	5.11%	7	0.73%	1	137
School gardens	11.41%	17	6.04%	9	149
Other strategies	4.00%	1	8.00%	2	25

The teaching strategies used least by teachers to provide nutrition education included computers and advanced technology, field trips, and guest speakers, role

playing, special events, team teaching, and student projects. The strategies used most were active discussion, hands-on learning, and collaborative work (Table 3.7).

Table 3.8. Do you integrate nutrition education into other subject areas? If so, to what extent do you integrate lessons about nutrition into the following subjects?

Subject Area	Blank	Not at all		Small extent	
		Percentage	n	Percentage	n
Health and physical education	76	21.09%	31	33.33%	49
History and social studies	83	55.00%	77	37.86%	53
Math	84	48.20%	67	42.45%	59
Reading and language arts	76	21.77%	32	51.70%	76
Science	74	20.81%	31	42.95%	64
Other, please specify:	204	78.95%	15	5.26%	1

Table 3.8. Continued.

Subject Area	Moderate extent		Great extent		Total
	Percentage	n	Percentage	n	

Health and physical education	27.21%	40	18.37%	27	147
History and social studies	6.43%	9	0.71%	1	140
Math	8.63%	12	0.72%	1	139
Reading and language arts	24.49%	36	2.04%	3	147
Science	28.86%	43	7.38%	11	149
Other, please specify:	0.00%	0	15.79%	3	19

The subject areas that nutrition education was most frequently integrated with included science and health and physical education. The subject areas that nutrition education was least frequently integrated with included history, social studies and mathematics (Table 3.8).

Table 3.9. Involving parents in nutrition education process.

Do you make active attempts to involve parents in the nutrition education process?	**Frequency (n)**	**Percent**	**Cumulative Frequency**	**Cumulative Percent**
Not at all	76	34.08	76	34.08
Small extent	121	54.26	197	88.34
Moderate extent	23	10.31	220	98.65
Great extent	3	1.35	223	100.00
Total	223			

Eighty-eight percent (n=197) of respondents replied that they made active attempts to involve parents in the nutrition education process to either a “small extent” or “not at all” (Table 3.9).

Table 3.10. What resources do you use in order to learn more about nutrition?

Resources	**Blank**	**Not at all**		**Small extent**
	n	**Percentage**	**n**	**Percentage**
MyPlate or Nutrition.gov online resources	31	37.50%	72	31.77%
Magazines	35	45.21%	85	39.36%
Blogs and websites	30	38.86%	75	36.27%
Nutrition textbooks	39	75.54%	139	15.22%
Learning materials provided by a nutrition education program	28	34.87%	68	37.44%
Other, please specify:	182	78.05%	32	4.88%

Table 3.10. Continued.

Resources	Small Extent	Moderate extent		Great extent		Total
	n	Percentage	n	Percentage	n	
MyPlate or Nutrition.gov online resources	61	26.04%	50	4.69%	9	192
Magazines	74	13.30%	25	2.13%	4	188
Blogs and websites	70	18.13%	35	6.74%	13	193
Nutrition textbooks	28	7.61%	14	1.63%	3	184
Learning materials provided by a nutrition education program	73	21.03%	41	6.67%	13	195
Other, please specify:	2	4.88%	2	12.20%	5	41

The resources that teachers used the least to learn about nutrition included nutrition textbooks and magazines. Teachers most frequently used MyPlate or Nutrition.gov online resources or learning materials provided by a nutrition education program to learn more about nutrition (Table 3.10).

Table 3.11. Teacher perception of resource availability through school for nutrition education.

Do you feel that resources are available to you through your school for educating your students about nutrition?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
No response	2	0.90	2	0.90
Not at all	40	17.94	42	18.83
Small extent	90	40.36	132	59.19
Moderate extent	73	32.74	205	91.93
Great extent	18	8.07	223	100.00
Total	223			

Seventy-three percent (n=163) of respondents reported that their school provided the necessary resources to help teachers educate students about nutrition to either a small or moderate extent (Table 3.11).

3.4 Teacher Perspectives On Nutrition Education

Table 3.12. Should nutrition education be a part of elementary school curriculum?

Do you agree that nutrition education should be a part of elementary school curriculum?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
Not at all	1	0.45	1	0.45
Small extent	31	13.90	32	14.35
Moderate extent	110	49.33	142	63.68
Great extent	81	36.32	223	100.00
Total	223			

Out of the respondents who rated their belief that nutrition education should be a part of elementary school curriculum, 49.33% (n=110) of respondents agreed that nutrition education should be a part of elementary school curriculum to a moderate

extent. Another 36.32% (n=81) of respondents answered “great extent.” In total, 85.65% (n=191) of teachers agreed that nutrition education should be a part of elementary school curriculum to a moderate or great extent (Table 3.12).

Table 3.13. Is it the teacher’s role and responsibility to provide nutrition education to students?

Do you believe that it is the teacher’s role and responsibility to provide nutrition education to students?	**Frequency (n)**	**Percent**	**Cumulative Frequency**	**Cumulative Percent**
No response	1	0.45	1	0.45
Not at all	10	4.48	11	4.93
Small extent	96	43.05	107	47.98
Moderate extent	94	42.15	201	90.13
Great extent	22	9.87	223	100.00
Total	223			

Out of the respondents who rated their belief about the teachers’ roles and responsibilities for providing nutrition education, 85.20% (n=190) of teachers answered that they believed that nutrition education was the teacher’s role and responsibility to a small or moderate extent, with only 9.87% (n=22) of teachers answering that nutrition education was the teacher’s responsibility to a great extent (Table 3.13).

Table 3.14. Teacher perception of administrative support and encouragement for nutrition education.

Do you feel that your school's administration is encouraging and supportive of nutrition education in the classroom setting?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
No response	3	1.35	3	1.35
Not at all	19	8.52	22	9.87
Small extent	77	34.53	99	44.39
Moderate extent	85	38.12	184	82.51
Great extent	39	17.49	223	100.00
Total	223			

Response distribution for level of perceived administrative support for nutrition education mirrors the response distribution for administrative resource provision in that 72.65% (n=162) of respondents reported that they felt that their school's administration was supportive of nutrition education in the classroom setting to either a small or moderate extent (Table 3.14).

3.5 Self Efficacy and Training

Table 3.15. Teacher self-rated confidence level in nutrition knowledge.

How confident are you in your knowledge of nutrition?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
Very confident	58	26.01	58	26.01
Somewhat confident	115	51.57	173	77.58
Neutral	41	18.39	214	95.96
Somewhat not confident	8	3.59	222	99.55
Not confident	1	0.45	223	100.00
Total	223			

About 77.58% (n=173) of respondents reported being either very confident or somewhat confident in their knowledge of nutrition. Only 4% (n=9) of respondents reported being somewhat not confident or not confident in their knowledge of nutrition (Table 3.15).

Table 3.16. Provision of staff training from school regarding nutrition education.

Have you received staff training from your school that addresses nutrition education?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
Yes	29	13.00	29	13.00
No	194	87.00	223	100.00
Total	223			

Eighty-seven percent (n=194) of respondents reported not receiving any training from their school that addressed nutrition education. Only 13% (n=29) of respondents reported receiving training form their school that addressed nutrition education (Table 3.16).

Table 3.17. Distribution of the number of hours of training teachers received in the past year.

How many hours of training have you received in the past year?	Frequency (n)	Percent	Cumulative Frequency	Cumulative Percent
No response	194	87.00	194	87.00
1 hour	19	8.52	213	95.52
2 hours	8	3.59	221	99.10
3 hours	2	0.90	223	100.00
4 hours	0	0.00	223	100.00
More than 4 hours	0	0.00	223	100.00
Total	223			

Of the 13% (n=29) of respondents who reported receiving training for nutrition education through their school, 65% (n=19) reported receiving only 1 hour of training. Participants who answered that they had not received training did not have the option of providing a response for the number of hours of training received (Table 3.17).

3.7 School Wellness Policies

Table 3.18. Do you have the following policies readily available to you at your school?

Policy	Blank	Yes		No	
		Percentage	n	Percentage	n
School or district Wellness Policy	5	73.39%	160	4.59%	10
Healthy Fundraising Policy	19	13.73%	28	26.47%	54
Healthy School Celebration Policy	10	36.15%	77	23.94%	51
Healthy Snack Policy	6	53.00%	115	23.50%	51
Other, please specify	193	10.00%	3	20.00%	6

Table 3.18. Continued.

Question	Unsure		Total
	Percentage	n	
School or district Wellness Policy	22.02%	48	218
Healthy Fundraising Policy	59.80%	122	204
Healthy School Celebration Policy	39.91%	85	213
Healthy Snack Policy	23.50%	51	217
Other, please specify	70.00%	21	30

A majority of respondents (73.39%, n=160) replied that their school had a school wellness or district wellness policy, and 53% (n=115) of respondents also reported having healthy snack policies at their schools. Teachers were more unsure if their school had other policies, such as healthy fundraising policies and healthy school celebration policies (Table 3.18).

3.8 Barriers to Nutrition Education

Figure 3.3. Common barriers to providing nutrition education in elementary school settings.

The most common barrier teachers faced when providing nutrition education to their students was time, either for working nutrition education into the curriculum or for preparing for nutrition lessons. Sixty-two percent (n=115) of participants cited time as a primary barrier to providing nutrition education (Figure 3.3).

3.9 School Health Environment

Table 3.19. In what ways and to what extent is your school environment supportive or conducive to making healthy choices, including eating nutritiously? Check all that apply:

Environmental Supports	Blank	Not at all		Small extent	
		Percentage	n	Percentage	n
Providing healthy options, such as a salad bar, for all students at lunch time	1	9.01%	20	16.67%	37
Positive/health advertisements in hallways and classrooms	4	17.35%	38	45.21%	99
Time set aside for snack time with enforced rules on bringing healthy snacks	5	22.48%	49	37.61%	82
20-30 minutes set aside for physical activity during the school day	2	2.71%	6	14.93%	33
Processed-snack food vending machines	6	88.02%	191	6.91%	15
Soda or sugar-sweetened beverage vending machines	6	81.57%	177	13.82%	30
Other environmental factors:	199	75.00%	18	0.00%	0

Table 3.19. Continued.

Environmental Supports	Moderate extent		Great extent		Total
	Percentage	n	Percentage	n	
Providing healthy options, such as a salad bar, for all students at lunch time	24.77%	55	49.55%	110	222
Positive/health advertisements in hallways and classrooms	23.29%	51	14.16%	31	219
Time set aside for snack time with enforced rules on bringing healthy snacks	22.02%	48	17.89%	39	218
20-30 minutes set aside for physical activity during the school day	30.32%	67	52.04%	115	221

Eighty-eight percent (n=191) and 81.57% (n=177) of respondents reported that their schools did not have processed snack food or sugar-sweetened beverage vending machines, respectively. Another 45.21% (n=99) of respondents reported that their schools had positive/health advertisements in hallways and classrooms, and 37.61% (n=82) reported that to a small extent their schools set aside snack time with enforced rules. Approximately half of respondents (52.04%, n=115) reported that their schools set aside 20-30 minutes per day for physical activity to a great extent, and another 49.55% (n=110) reported that their schools provided healthy options, such as salad bars, for students at lunch time to a great extent (Table 3.19).

3.10 Dose of Nutrition Education Cross Analysis

Table 3.20. This past school year (2015-2016) estimate the number of hours you or a community nutrition educator provided nutrition education to your students.

Education Provider	Frequency (n)	Mean (hrs.)	Standard Deviation	Minimum	Median	Maximum
Classroom Teacher	174	6.26	6.11	0	4	30
Community Nutrition Educator	129	5.50	5.62	0	4	30
Total	303					

Out of the 228 complete responses, 174 respondents provided an answer for the amount of time they spend teaching nutrition (TTN) in the classroom, and 129 respondents provided an answer for the amount of time a community nutrition educator spends teaching in the classroom. These respondent populations were not separate populations in that respondents were capable of providing answers for the number of hours they spent teaching and the number of hours a community educator spent teaching.

There was no significant difference between time spent teaching nutrition education for classroom teachers and community nutrition educators, (p=0.33). Although the difference between the time spent teaching nutrition for classroom teachers and community nutrition educators was not statistically significant, it was more common for teachers to provide nutrition education rather than community nutrition educators (Table 3.20).

Table 3.21. Grade level taught in relation to time spent teaching nutrition.

Grade Level	Mean (Hrs.)	SD

Kindergarten	4.64	5.36
First	4.12	5.64
Second	4.15	5.30
Third	3.70	4.77
Fourth	3.97	5.94
Fifth	4.09	6.34

The mean difference in hours between time teaching for kindergarten and third grade, which had the highest and lowest averages for time teaching, respectively, was -0.94, and was not significant (p=0.52), therefore the differences between time spent teaching nutrition for each grade level was not statistically significant (Table 3.21).

Table 3.22. TTN of teachers in comparison with teacher belief in role and responsibility of providing nutrition education, descriptive statistics.

Do you believe that it is the teacher's role and responsibility to provide nutrition education to students?	**Frequency (n)**	**Mean (hrs.)**	**SD**
Not at all	5	2.40	3.21
Small extent	70	4.30	4.60
Moderate extent	79	7.29	6.31
Great extent	19	10.21	7.94
Total	173	6.26	6.13

The amount of time teachers spent educating their students about nutrition increased steadily as teacher's belief that it was their role and responsibility to provide nutrition education increased, from "not at all" ($n=5$, 2.4 $\pm$ 3.21), "small extent" ($n=70$, 4.3 ± 4.6), "moderate extent" ($n=79$, 7.29 ± 6.31), and "great extent" ($n=19$, 10.21 ± 7.94) (Table 3.22).

Table 3.23. TTN of teachers in comparison with teacher belief in role and responsibility of providing nutrition education, Welch ANOVA.

	Statistic	**df1**	**df2**	**Sig.**

Welch	6.979	3	18.470	.002*

*Significance $p<0.05$

The amount of time teachers spent educating their students about nutrition was statistically significantly different for different levels of teacher's belief that it was the teacher's role and responsibility to provide nutrition education, Welch's $F(3, 18.47) = 6.98$, $p < 0.05$). A Welch ANOVA was used because the assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p=0.005$) (Table 3.23).

Table 3.24. TTN of teachers in comparison with teacher belief in role and responsibility of providing nutrition education, Games-Howell Post Hoc Test.

Cross Comparisons	Mean Difference (hrs.)	Significance
1-2	-1.90	0.63
1-3	-4.89	0.08
1-4	-7.81	0.02*
2-3	-2.99	0.01*
2-4	-5.91	0.03*
3-4	-2.92	0.46

*The mean difference is significant at $p<0.05$

Survey responses were coded as: 1 = not at all, 2 = small extent, 3 = moderate extent, and 4 = great extent. Games Howell post hoc analysis indicated that teachers who believed to both moderate and great extents (7.29 ± 6.31 and 10.21 ± 7.94, respectively) that it was their role and responsibility to provide nutrition education to their students taught significantly more nutrition than teachers who did not believe that it was their role and responsibility to provide nutrition education (2.4 ± 3.21), ($p=0.08$ and $p=0.02$, respectively). The difference between the amount of nutrition taught by teachers who believed that nutrition education was their responsibility to a small extent (4.3 ± 4.6) and to a moderate extent (7.29 ± 6.31) was also statistically significant ($p=0.01$) (Table 3.24).

Table 3.25. TTN in comparison with teacher belief that nutrition education should be a part of elementary school curriculum, descriptive statistics.

Do you agree that nutrition education should be a part of elementary school curriculum?	Frequency (n)	Mean (hrs.)	SD
Small extent	24	3.92	4.36
Moderate extent	86	5.86	5.67
Great extent	64	7.67	6.92
Total	174	6.26	6.11

The amount of time teachers spent providing nutrition education increased steadily as their reported belief that nutrition education should be included in elementary school curriculum increased from a "small extent" (*n=24*, 3.92 ± 4.36) to a "great extent" (*n=64*, 6.26 ± 6.11) (Table 3.25).

Table 3.26. TTN in comparison with teacher belief that nutrition education should be a part of elementary school curriculum, ANOVA.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	273.09	2	136.55	3.77	.03*
Within Groups	6188.27	171	36.19		
Total	6461.36	173			

*Significance $p<0.05$

The amount of time teachers spent providing nutrition education to their students was statistically significantly different for different levels of belief that nutrition education should be included in elementary school curriculum, $F(2, 171) = 3.77$, $p < 0.05$) (Table 3.26).

Table 3.27. TTN in comparison with teacher belief that nutrition education should be a part of elementary school curriculum, Tukey Post Hoc Test.

Cross Comparisons	Mean Difference (hrs.)	Significance
1-2	-1.94	0.34
1-3	-3.76	0.03*
2-3	-1.81	0.17

*Significance $p<0.05$

Survey responses were coded as: 1 = small extent, 2 = moderate extent, and 3 = great extent. The response option "not at all" was excluded from this analysis because there were no respondents for this category who also taught nutrition education. Tukey post hoc analysis indicated that teachers who believed that nutrition education should be included in elementary school curriculum to a small extent (3.92 ± 4.36) taught significantly less nutrition education than teachers who believed to a great extent (6.26 ± 6.11) that nutrition should be included in the elementary school curriculum (p=0.03) (Table 3.27).

Table 3.28. TTN of teachers in comparison with perceived administrative support, descriptive statistics.

Do you feel that your school's administration is encouraging and supportive of nutrition education in the classroom setting?	Frequency (n)	Mean (hrs.)	SD
Not at all	12	3.50	3.06
Small extent	59	4.34	4.72
Moderate extent	72	7.49	5.43
Great extent	29	8.55	9.20
Total	172	6.31	6.13

The amount of time that teachers spent providing nutrition education increased steadily as teachers felt more supported by their school's administration for providing nutrition education, from "not at all" (*n=12*, 3.50 ± 3.06), "small extent" (*n=59*, 4.34 ±

4.72), “moderate extent” (*n=72*, 7.49 ± 5.43), to “great extent” (*n=29*, 8.55 ± 9.20) (Table 3.28).

Table 3.29. TTN of teachers in comparison with perceived administrative support, Welch ANOVA.

	Statistic	df1	df2	Sig.
Welch	6.98	3	48.21	0.005*

*Significance $p<0.05$

The amount of time teachers spent providing nutrition education was statistically significant for different levels of teacher’s perception that their school’s administration was supportive of nutrition education efforts, Welch’s $F(3, 48.21) = 6.98$, $p < 0.005$). A Welch ANOVA was used because the assumption of homogeneity of variances was violated, as assessed by Levene’s test for equality of variances ($p=0.005$) (Table 3.29).

Table 3.30. TTN of teachers in comparison with perceived administrative support, Games-Howell Post Hoc Test.

Cross Comparisons	Mean Difference (hrs.)	Significance
1-2	-0.84	0.86
1-3	-3.99	0.01*
1-4	-5.05	0.06
2-3	-3.15	0.00*
2-4	-4.21	0.11
3-4	-1.07	0.94

* The mean difference is significant at $p<0.05$

Survey responses were coded as: 1 = not at all, 2 = small extent, 3 = moderate extent, and 4 = great extent. Games-Howell post hoc analysis indicated that the difference in the amount of time spent providing nutrition education for teachers who believed that their school’s administration was not supportive of nutrition education (3.50 ± 3.06) in comparison with the time spent providing nutrition education for teachers who believed

their school's administration was moderately supportive (7.49 ± 5.43) was statistically significant (p=0.01). The amount of time spent providing nutrition education was also statistically significantly greater for teachers who believed their school's administration was supportive to a moderate extent (7.49 ± 5.43) than for teachers who believed their school's administration was supportive to a small extent (4.34 ± 4.72), (p=0.00) (Table 3.30).

Table 3.31. TTN of teachers in comparison with level of confidence in nutrition knowledge, descriptive statistics.

How confident are you in your knowledge of nutrition?	**Frequency (n)**	**Mean (hrs.)**	**SD**
Very confident	47	6.51	6.13
Somewhat confident	87	6.99	6.48
Neutral	32	4.22	4.71
Somewhat not confident	8	5.00	5.86
Total	174	6.26	6.11

The amount of time teachers spend providing nutrition education did not steadily increase or decrease depending on teacher's confidence in their knowledge of nutrition, from "very confident" (*n=47*, 6.51 ± 6.13), "somewhat confident" (*n=87*, 6.99 ± 6.48), "neutral" (*n=32*, 4.22 ± 4.71), to "somewhat not confident" (*n=8*, 5.00 ± 5.86) (Table 3.31).

Table 3.32. TTN of teachers in comparison with level of confidence in nutrition knowledge, ANOVA.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	195.16	3	65.05	1.77	.16
Within Groups	6266.20	170	36.86		
Total	6461.36	173			

The amount of time teachers spent providing nutrition education was not statistically significantly different for different levels of confidence in nutrition knowledge $F(3, 170) = 1.77$, $p > 0.05$) (Table 3.32).

Table 3.33. TTN of teachers in comparison with level of confidence in nutrition knowledge, Tukey Post Hoc Test.

Cross Comparisons	Mean Difference (hrs.)	Significance
1-2	-0.48	0.97
1-3	2.29	0.36
1-4	1.51	0.92
2-3	2.77	0.13
2-4	1.99	0.81
3-4	-0.78	0.99

Survey responses were coded as: 1 = very confident, 2 = somewhat confident, 3 = neutral, and 4 = somewhat not confident. Tukey post hoc analysis indicated that there was no statistically significant difference in the amount of time teachers spent providing nutrition education between different confidence levels in nutritional knowledge, ($p>0.05$) (Table 3.33).

Table 3.34. TTN of teachers in comparison with school free and reduced priced meals eligibility, descriptive statistics.

School student body eligibility for free and reduced priced meals	Frequency (n)	Mean (hrs.)	SD
> 50% Eligible	130	10.01	9.82
< 50% Eligible	89	5.43	6.22
Total	219	8.15	8.82

The mean number of hours that teachers spent providing nutrition education in schools where 50% or more students were eligible for free or reduced priced meals (*n=130*, 10.01 ± 9.82) was greater than that for schools were fewer than 50% of students were eligible for free or reduced priced meals (*n=89*, 5.43 ± 6.22) (Table 3.34).

Table 3.35. TTN of teachers in comparison with school free and reduced priced meals eligibility, Welch ANOVA.

	Statistic	df1	df2	Sig.
Welch	17.83	1	215.84	.0005*

*Significance $p<0.05$

The amount of time teachers spent providing nutrition education was significantly greater in schools where 50% or more students were eligible for free or reduced priced meals (10.01 ± 9.82) in comparison with schools where fewer than 50% of students were eligible for free or reduced priced meals (5.43 ± 6.22), Welch's $F(1, 215.84) = 17.83$, $p < 0.005$). A Welch ANOVA was used because the assumption of homogeneity of variances was violated, as assessed by Levene's test for equality of variances ($p=0.0005$) (Table 3.35).

Table 3.36. TTN of teachers in comparison with school free and reduced priced meals eligibility, Pearson Correlation.

		1 = Eligible, 2 = Not	Total Time Teaching Nutrition
1 = Eligible, 2 = Not	Pearson Correlation	1	-.256
	Sig. (2-tailed)		.000*
	N	219	219
Total Time Teaching Nutrition	Pearson Correlation	-.26	1
	Sig. (2-tailed)	.000*	
	N	219	227

*Correlation is significant at $p<0.01$

A Pearson's product-moment correlation was run to assess the relationship between time teachers spent providing nutrition education and their school's student body eligibility for free and reduced priced meals. Preliminary analysis showed the relationship to be slightly linear. There was a statistically significant, small, negative correlation between time teaching nutrition and school income level, $r(219) = -0.26$, $p<0.0005$ (Table 3.36).

Table 3.37. Amount of time community educators provide nutrition education in comparison to school eligibility levels for free and reduced price lunch, Unpaired T-test.

School student body eligibility for free and reduced priced meals	Frequency (n)	Average Time Teaching by Community Nutrition Educators (hrs./yr.)	SD	P Value
> 50% Eligible	130	4.40	5.85	0.00*
< 50% Eligible	89	1.52	3.00	
Total	219			

*Significance $p<0.05$

The difference between the amount of nutrition education that community nutrition educators provided in schools where 50% of students were eligible for free and reduced price meals compared to schools with less than 50% of students who qualified for free or reduced price meals was statistically significant (Table 3.37).

Table 3.38. Amount of time classroom teachers provide nutrition education in comparison to the amount of professional training received through their school in regards to nutrition. Unpaired T-test.

Training Received	Frequency (n)	Mean (hrs.)	SD	P Value
Yes	29	8.52	7.71	0.008*
No	194	4.34	5.51	
Total	223			

*Significance $p<0.05$

Teachers who had received some form of training in nutrition education from their school (n=29) provided an average of 8.52 ± 7.71 hours of nutrition education each year. The average amount of time spent teaching nutrition for teachers who had received no training in nutrition education (n=194*)* was 4.34 ± 5.51. This difference was statistically significant (p=0.008), therefore teachers who had received some form of training in nutrition education from their school provided significantly more nutrition education than teachers with no training in nutrition education (Table 3.38).

Table 3.39. Amount of time classroom teachers provided nutrition education in comparison with the amount of professional training received through an external nutrition education program in regards to nutrition education, Unpaired T-test.

Training Received	Frequency (n)	Mean (hrs.)	SD	P Value
Yes	24	8.30	6.67	0.12
No	151	5.95	5.99	
Total	175			

Teachers who had received training in nutrition education from an external nutrition education program provided more nutrition education on average (n=24, 8.3 ± 6.67) than teachers who had received no training from an external nutrition education

program (n=151, 5.95 ± 5.99), however, this difference was not statistically significant, (p>0.05) (Table 3.39).

CHAPTER 4

DISCUSSION OF RESULTS

4.1 Demographics

Data collected indicated that there was an equal distribution of teachers from each grade level K-5 who participated in the survey. This research was comparable to past studies which have also focused solely on elementary school educators.[8,10,11,13,16,19]

The distribution of the number of years that participants had been teaching was evenly distributed from 0-20 years, however, approximately one-third of participants (31.84%) had been teaching for more than 20 years. In comparison with similar studies, where number of years teaching was assessed on a scale from 0 to greater-than-20, this study's results indicated a similar distribution of years teaching as teachers in other states.[12,16,20]

The distribution of participant schools where 50% or more of the students were eligible for free or reduced price meals mirrored state data. Survey data indicated that 59% of respondents taught at schools where 50% or more students were eligible for free or reduced priced meals. Statewide, 54.4% of Maine elementary schools have 50% or more students who qualify for free or reduced priced meals. This data is important to collect when researching nutrition education practices because schools where 50% of students are eligible for free or reduced priced meals qualify for federal nutrition education programs such as SNAP-Ed or EFNEP,[33,36] which could potentially increase the amount of nutrition education provided by those schools.

4.2 External Program Collaboration

According to survey data, the most commonly used external nutrition education program used by Maine elementary schools was Let's Go 5-2-1-0! with 46.64% (n=104) of respondents answering that the program was used at their school. Another 39.01% (n=87) of respondents were unsure which programs were used at their school or were unsure if there was collaboration with external nutrition education programs at all. Interestingly, although fewer Maine schools use Let's Go 5-2-1-0! nutrition programming (n=214) than Alliance For a Healthier Generation (n=300)[36] or Fuel Up To Play 60 (n=530), Let's Go 5-2-1-0! had a higher reported use from survey participants than the other two programs.

This data cannot be compared to external nutrition education program use in other states because available programs vary by region, just as F.A.R.M.S is only available to schools in Lincoln County, Maine, and Let's Go 5-2-1-0! is only currently available in Maine, Massachusetts, and New Hampshire.[40,46] Additionally, the distribution of state use of external nutrition education programs has not yet been discussed in the literature, so there is no substantial data on this topic at the time.

As most survey respondents were unsure which programs their school utilized, 43.05% (n=96) of survey respondents were also unsure of the form of collaboration between their school and any external nutrition education programs. The distribution of the form of collaboration, however, was evenly distributed, with near equal amounts of survey respondents reporting that their schools had nutrition educators teach in classroom settings (18.39%, n=41), external programs provided teachers with resources or teaching

materials (16.14%, n=36), or a combination of the two separate approaches (17.94%, n=40).

According to survey data, the most frequent form of support that classroom teachers reported receiving from external nutrition education programs included worksheets, handouts, and activities (39.46%, n=88), and online resources (28.7%, n=64). Although there was no pre-existing data on what support materials teachers received most frequently from external nutrition education programs, research shows that teachers most commonly use supplementary materials to plan for and teach nutrition lessons, including information sheets, magazines, and videotapes, which come from either the school or an external nutrition program.[8-10]

4.3 Resources and Methods

There was no conclusive data as to which resources teachers used the most when developing and teaching nutrition education lessons. The resources survey participants reported using "not at all" or to a "small extent" were also categorized as most used to a "moderate" and "great extent" by other survey participants. This occurred most distinctly for resources such as worksheets and handouts. This indicated that there was no singular resource or set of resources that was most commonly used in nutrition education, and that resource utilization varied among classroom teachers. As discussed in relation to resources provided by external nutrition education programs, the literature indicates that teachers most commonly use supplementary materials, curriculum guides, information sheets, video tapes, and magazines when preparing for and teaching nutrition lessons.[8,9,13] However, when learning more about nutrition, Maine teachers most frequently use online

resources such as MyPlate or Nutrition.gov, or learning materials provided by a nutrition education program. In the current study, although teachers used supplementary materials, curriculum guides or information sheets to prepare nutrition lessons, they did not frequently use these resources to self-educate.

The most common teaching strategies used by survey participants included active discussion, hands-on learning, and collaborative work, which falls in line with findings from studies that also analyzed teaching strategies for nutrition,[8,11] with hands-on learning as the most frequently discussed method for educating students about nutrition. Interactive teaching practices, such as hands-on learning, are important in facilitating the development of not only increased knowledge in nutrition, but increased healthy behavioral practices surrounding nutrition and increased analytical knowledge to carry out those behavioral practices.[27]

A common strategy for incorporating nutrition education into the curriculum is to combine nutrition education with other subject areas.[8,11,12] While Stang and colleagues found that over half of teachers they surveyed used a combination a integrating nutrition into other subjects and teaching it alone, Watts and colleagues found that the majority of teachers surveyed combined nutrition education with health, physical education, or science to a great or moderate extent.[8,12] Maine results mirror findings from Stang and Watts in that survey participants reported combining nutrition education with health, physical education, and science when integrated. Nutrition education was also least integrated into subjects such as math or social studies, which is also in line with past research.[12]

Survey results indicated that the majority of Maine teachers (88.34%, n=197) did not often make attempts to involve parents in nutrition education, which was unique from past research. For example, Stang and colleagues' evaluation on teacher perceptions and practices surrounding nutrition education indicates that 45% of teachers tried to involve parent in the nutrition education process, even though only 3% of teachers reported that parents actually participated.[12] Research by Levine and colleagues had similar results, finding that all Team Nutrition schools made efforts to include parents in nutrition education.[9] Low levels of parental involvement in nutrition education in Maine could be due to minimal reported hours of provided nutrition education, or to a lack of program support, which was present in Levine and colleague's assessment of Team Nutrition programing.[9]

The majority of Maine survey respondents (73.1%, n=163) reported feeling that their schools provided the resources needed for educating their students about nutrition. This result fell in line with an assessment of Mississippi elementary teachers' practices and perspectives on nutrition education by Lambert and colleagues, who found that 63% of teachers agreed that their school administrations provided the necessary resources for educating students about nutrition.[16]

4.4 Teacher Perspectives On Nutrition Education

Survey results indicated that the majority of Maine teachers surveyed (85.65%, n=191) believed that nutrition education should be a part of elementary school curriculum, reflecting the results of a phenomenological survey of teacher practices and perspective on nutrition by Hall and colleagues, in which many teachers expressed that nutrition education was essential for young students because of its effect on children's lifestyle habits and choices later in life.[14] This is a general agreement among elementary school teachers that has been documented extensively in the literature.[10,12,14-16] Likewise, in the current research, 85.2% (n=190) of survey respondents agreed to either a small or moderate extent that it was the teacher's role and responsibility to provide nutrition education. This result was also concluded in several studies.[10,14,16]

The majority of Maine teachers surveyed (72.65%, n=162) also indicated that they thought their school's administration was supportive of nutrition education in the classroom setting. In an assessment on the perceptions of elementary school principals, teachers, and food service worker on nutrition education, Lambert and Carr found that the vast majority of school principals were supportive of nutrition education at their schools, but that as far as resource provision went, only 53% of school principals reported that adequate funds were allocated to support nutrition education efforts.[16] Additionally, lack of administrative support was indicated as not being a barrier to providing nutrition education in past research.[12]

4.5 Self Efficacy and Training

The majority of Maine teachers surveyed (77.58%, n=173) reported that they were somewhat or very confident in their knowledge of nutrition. Although other studies did not directly ask teachers for their confidence level regarding nutrition concepts, past research has found confidence to be related to time teachers spend providing nutrition education, nutritional knowledge, and amount of training in nutrition concepts.[10,19,20]

The majority of Maine teachers surveyed (87%, n=194) also reported receiving no staff training from their school addressing nutrition education, and of those who had received training, 65% (n=19) had only received one hour of training. Past research indicates mixed results. Some majority populations of teachers have received some form of nutrition training, even if it is not specifically from their school,[12] while other surveyed populations severely lacked both formal and informal training in nutrition.[10]

4.6 School Wellness Policies

The majority of respondents (73.39%, n=160) reported that their school had a school wellness or district wellness policy. Because this data was collected from school teachers, and not all teachers may be aware of their school wellness policies, the number of schools with wellness policies in Maine may in fact be higher than reported. According to the Child Nutrition and WIC Reauthorization Act of 2004, all schools that participate in the National School Lunch Program must adopt school wellness policies containing specific guidelines for providing nutrition education.[47]

Other policies that are not required, but that may have an influence on student health, include healthy fundraising policies, healthy school celebration policies, and

healthy snack policies. Analysis of survey data shows that 53% (n=115) of Maine teachers reported having healthy snack policies at their schools, but fewer teachers reported having healthy school celebration policies (36.15%, n=77) or healthy fundraising policies (13.73%, n=28). Because this data is based off of teacher knowledge and awareness of school policies, it is not a reliable representation of the number of schools in Maine that actually implement these policies, however teacher knowledge of school health policies may have an impact on the amount of time teachers spend on nutrition education.[8,16]

4.7 Barriers to Nutrition Education

The most pertinent barrier to providing nutrition education according to Maine elementary teachers was time. Sixty-two percent of participants cited time as a barrier to providing nutrition education to their students. This result was consistent with past research findings, where lack of time, resources, and training were the most commonly cited barriers to teachers providing nutrition education.[8-10,12,13,16]

4.8 School Health Environments

According to survey data, schools in Maine made strides toward more health positive environments through the inclusion of healthy options, such as salad bars at lunch time or through the exclusion of vending machines for sugar-sweetened snacks and beverages. The presence of vending machines in schools has been negatively correlated with fruit and vegetable consumption,[3] so their removal may potentially lead to healthier eating behaviors for students. Community and environmental interventions that include

such changes are common, because they specifically target intake of sugar-sweetened beverages and energy dense foods, which can increase risk for weight gain and obesity.[48] Although schools in Maine have made progress in improving school health environments, currently there are no federal nutrition guidelines for competitive foods – foods which are sold in schools separately from the National School Lunch Program (NSLP).[3]

4.9 Dose of Nutrition Education

In order for nutrition education to incite behavior change, students need to receive 50 hours or more of nutrition education over the course of the school year.[6] Multiple studies have shown that elementary teachers across the United States are teaching far below the recommended amount of nutrition education,[8-13,19-21] which, in theory, could have an impact on the effectiveness of the nutrition education provided. Teachers in the current study also fell far below the recommended yearly amount for nutrition education taught (n=174, 6.26 ± 6.11). This dose of nutrition education, though, was significantly impacted by a variety of factors.

The amount of time teachers spent providing nutrition education in Maine increased with increasing belief that it was the teacher's role and responsibility to provide nutrition education to students. Increases in time spent teaching nutrition was also significant for increasing beliefs that nutrition education should be included in elementary school curriculum. Although many studies assessed teachers' beliefs surrounding nutrition education,[8-13,19-21] these beliefs were never analyzed in comparison with the amount of nutrition education teachers provided, making it difficult to compare this relationship to past research.

In the current study, teachers provided statistically significantly more nutrition education to their students when they felt that their school's administration was supportive and encouraging of nutrition education in the classroom setting. Although past research findings suggest that administrative support is critical for the effective implementation of nutrition education programming,[16] studies that discussed administrative support did not compare this variable to time teacher's spent providing nutrition education.[16]

In the current study, there was no statistically significant difference in the amount of nutrition education provided by teachers who had low confidence in their nutritional knowledge and teachers who had high confidence in their nutritional knowledge. This was in contrast to past studies, which indicated that higher levels of self-efficacy for nutritional knowledge was related to providing higher amounts of nutrition education.[19,20] This statistical difference in findings could have been affected by the wording differences for self-efficacy measurement questions. In the current study, self-efficacy was measured using a singular question for self-rating confidence in nutritional knowledge, whereas past studies have utilized self-efficacy questionnaires, subscales, and questions sets to determine nutritional knowledge self-efficacy levels.[19,20]

Time teacher's spent providing nutrition education in Maine was also linked to the socioeconomic status of their students. At schools where 50% or more students were eligible for free or reduced priced lunch, teachers provided significantly more nutrition education ($n=130$, 10.01 ± 9.82) than teachers at schools where fewer than 50% of students were eligible for free or reduced priced meals ($n=89$, 5.43 ± 6.22). This is an important factor when assessing nutrition education because schools where 50% or more

students are eligible for free or reduced priced lunch qualify for federal nutrition education programming through SNAP-Ed or EFNEP.[31-36] As a result, schools with students of low socioeconomic status receive more nutrition education than schools with students of higher socioeconomic status. Additionally, schools that qualify for federal programming like SNAP-Ed and EFNEP, have statistically significantly more nutrition education provided through community nutrition educators than schools that do not qualify for federal nutrition education programming. The relationship between student socioeconomic status and the components of nutrition education have not been assessed in the literature in a similar way to the current study, however, minimal past studies have evidenced that there may be a link between amount of nutrition education taught in schools and student ethnicity.[8] In an assessment of nutrition education in New York elementary schools, Watts and colleagues found that schools with greater than 80% non-white students taught significantly less nutrition education than schools with less than 80% non-white students[8]. Although the relationship between time teaching nutrition and socioeconomic status of schools was not statistically significant in Watt's study, more research would be needed to determine if there was an actual link between student ethnicity, socioeconomic status, and time teaching nutrition.

Lastly, Maine teachers taught significantly more nutrition education if they had received previous training in nutrition education from their schools. This relationship has been determined by past research as well, where teachers with little or no training were less likely to provide nutrition education to their students, and teachers who had received some form of training, regardless of the type of training, were more likely to provide nutrition education to their students.[12,19] In the current study, however, there was a

difference in the significance for the amount of nutrition education provided and the form of training. Although teacher's who received training from their schools taught significantly more nutrition than teachers who had not received training from their schools, teachers who received training from external nutrition education programs did not provided significantly more nutrition education than teachers who had not received training from an external nutrition education program. This indicates that more research is needed on methods for teacher training in nutrition education.

CONCLUSIONS

The objective of this research was to determine how the multiple influencing factors of nutrition education, relating to professional development, student body socioeconomic status, teacher self-efficacy, teacher beliefs, program use, wellness policies, and environmental factors influence the amount of time Maine elementary educators spend teaching nutrition in their classrooms. Results from the current study suggest that the amount of time teachers spend providing nutrition education in Maine is significantly related to teachers' beliefs surrounding nutrition education in schools, perceived administrative support for nutrition education, student body socioeconomic status, and training in nutrition education.

In accordance with the factors that affect the amount of nutrition education provided in Maine elementary schools, and considering the relatively low amount of nutrition education provided by Maine elementary teachers in comparison with the current recommendations,[21,27] nutrition education programming in Maine could be improved in a variety of ways. This improvement could be accomplished by providing more training opportunities for teachers, both through their schools and external nutrition education programs, for providing nutrition education to their students and overcoming some of the barriers to providing the education. More awareness could be raised for nutrition education programs that schools could utilize, regardless of their qualifications for SNAP-Ed and EFNEP. Additionally, the there is a need to create nutrition education programs available to all children, regardless of school student body socioeconomic status, so that nutrition education is not limited by what school a child attends. Administrative support for nutrition education could be increased by educating school

superintendents and principles on the importance of nutrition education in Maine schools, and teachers could be educated on the importance of nutrition education to bolster teacher beliefs that nutrition education should be taught in elementary schools.

Teaching children at an early age how to adopt healthy eating habits through nutrition education is an important component of the work schools can do to combat childhood obesity.[1] In Maine, almost 30% of children are overweight or obese, making the state 21st in the nation for childhood obesity levels.[49] Because weight is difficult to lose and health is difficult to reestablish once children reach adulthood, prevention-based health programming must focus on children as the primary target for preventative programming efforts.[50]

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APPENDIX A – IRB Approval

(KEEP THIS PAGE AS ONE PAGE – DO NOT CHANGE MARGINS/FONTS!!!!!!!!)

APPLICATION FOR APPROVAL OF RESEARCH WITH HUMAN SUBJECTS
Protection of Human Subjects Review Board, 418 Corbett Hall, 581-1498

(Type inside gray areas)
PRINCIPAL INVESTIGATOR: Alexandra Courtney
EMAIL: alexandra.courtney@umit.maine.edu TELEPHONE: 207-590-2850
CO-INVESTIGATOR(S):
FACULTY SPONSOR (Required if PI is a student): Kate Yerxa
TITLE OF PROJECT: Nutrition Education In Maine Elementary Schools

START DATE: 08/15/2016 PI DEPARTMENT: Nutrition and Dietetics
MAILING ADDRESS: 66A Main St. Orono, Maine 04469
FUNDING AGENCY (if any): University of Maine Cooperative Extension
STATUS OF PI:
FACULTY/STAFF/GRADUATE/UNDERGRADUATE Undergraduate

1. If PI is a student, is this research to be performed:

☒ for an honors thesis/senior thesis/capstone? ☐ for a master's thesis?
☐ for a doctoral dissertation? ☐ for a course project?
☐ other (specify)

2. Does this application modify a previously approved project? N (Y/N). If yes, please give assigned number (if known) of previously approved project:

3. Is an expedited review requested? Y (Y/N).

Submitting the application indicates the principal investigator's agreement to abide by the responsibilities outlined in Section I.E. of the Policies and Procedures for the Protection of Human Subjects.

Faculty Sponsors are responsible for oversight of research conducted by their students. The Faculty Sponsor ensures that he/she has read the application and that the conduct of such research will be in accordance with the University of Maine's Policies and Procedures for the Protection of Human Subjects of Research. REMINDER: if the principal investigator is an undergraduate student, the Faculty Sponsor MUST submit the application to the IRB.

Email complete application to Gayle Jones (gayle.jones@umit.maine.edu)

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FOR IRB USE ONLY Application # 2016-08-03 Date received 08/04/2016 Review (F/E): E
Expedited Category:

ACTION TAKEN:

X Judged Exempt; category 2 on 8/5/2016 Modifications required? Y Accepted (date) 8/10/2016
☐ Approved as submitted. Date of next review: by Degree of Risk:
☐ Approved pending modifications. Date of next review: by Degree of Risk:
Modifications accepted (date):
☐ Not approved (see attached statement)
☐ Judged not research with human subjects

FINAL APPROVAL TO BEGIN 08/10/2016
Date

04/2016

AUTHOR'S BIOGRAPHY

Alexandra Courtney graduated from Thornton Academy in Saco, Maine in 2012. She entered the University of Maine undecided in her major with a minor in Pre-Medical Sciences. She declared a major in Human Nutrition and Dietetics after realizing her passion for healthy and mindful eating during her time as a student athlete on the University of Maine's Cross Country and Track Team. During her time in college, Courtney was an active leader as the Program's Chair of Kappa Omicron Nu Honors Society and as the Philanthropy Chair for her sorority Alpha Omicron Pi. Courtney will graduate from the University of Maine in December 2016, at which point she plans to travel extensively and catch as many life fish as she can so she has cool stories to tell her future dog and her future grandchild if she ever gets old.