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Extension Educators' Perceptions of the Local Food System

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Abstract: Extension educators in three Northeastern states were surveyed about their perspectives on 21 LFS topics. Educators identified all 21 topics to be important. Principal factor analysis was carried out to identify factors that underlie the importance of these issues. Five factors—food access, food system viability, localization of food systems, food safety and land use—accounted for 60.61% of the total variance. Educators' areas of primary program responsibility, gender, and previous participation in LFS activities revealed significant differences across the importance placed on the factors, suggesting that individual perspectives and professional responsibilities influence an educator's commitment to LFS engagement.

Introduction

Interest in local foods peaks during each growing season. Increasingly, efforts to expand access to local foods throughout the year are occurring. More localized, flexible purchasing options offered by producers and processors expand the choices available to individual and institutional buyers (Martinez et al., 2010). Such locally based food selection and production practices can increase the economic return to communities, while enhancing civic participation (Abel, Thomson, & Maretzki, 1999). However, in order to sustain a greater reliance on local foods, a community needs to define its vision for a local food system (LFS) (Thomson, Maretzki, & Harmon, 2007).

Strengthening the connections among community members involved in food production, marketing, and consumption so that they may define an LFS vision requires skilled leadership. Extension educators bring to

the community a wealth of knowledge from subject-matter expertise in food production, food processing, food marketing, diet, and nutrition, and skills in leadership, development, and facilitation. These connections can help develop human capital within communities to build the organizations needed to sustain a LFS infrastructure (Raison, 2010). To maximize Extension's effectiveness, however, educators need to understand how they and their colleagues at the community level perceive the importance of LFS issues and how their individual characteristics influence these perceptions.

Purpose and Objectives

The purpose of the study reported here was to understand the importance of local food system issues among Extension educators. The objectives of the study were to:

1. Describe the demographic profile of Extension educators;

2. Identify factors underlying Extension educators' perceptions of LFS issues; and

3. Determine differences, if any, between educators' demographic characteristics and their perceptions of LFS issues.

Methods

Population

The population for the study included all Extension field-based educators employed by Cornell University in New York, Rutgers University in New Jersey, and Pennsylvania State University in Pennsylvania (N=589). The study was a part of the tri-state project Strengthening Communities Engagement in Sustainable Local Food Systems funded by the USDA Sustainable Agriculture Research and Education Program. Educators have primary responsibilities for programming in one of four areas: family and consumer science, 4-H and youth development, community development, or agriculture and natural resources. The population totaling 589 Extension educators was obtained from the office of the Extension Director in each state.

Research Design and Instrumentation

Researchers used a descriptive research design. The survey was composed of four sections designed to collect data about educators' perceptions regarding the importance of LFS issues and about factors affecting LFS programming in the educators' communities. Section one contained statements about 21 LFS activities/issues, while section two contained statements about support factors and barriers affecting LFS programming. Statements in sections one and two were measured using a five-point Likert scale in which 1 was "very unimportant" and 5 was "very important." In section three, educators were asked to indicate whether they have been involved with various types of organizations to carry out LFS programming. Demographic information, such as gender, education, work experience, training received, and history of participation in LFS programming, and additional comments regarding LFS were collected in the final section.

The questionnaire was validated for content and face validity by a panel of seven experts involved in LFS programming, including food science and nutrition faculty and agricultural and Extension educators. In addition, a pilot study was conducted with Extension educators (N=30) employed by Ohio Cooperative

Extension. Cronbach's alpha was used to estimate the reliability of the instrument. Cronbach's alpha for the questions that assessed the importance of LFS issues and on which we primarily focus in this article was 0.89.

Data Collection and Analysis

Researchers at Penn State administered the Web-based survey in each state using Test Pilot software to manage data collection. A pre-notification letter describing the study was sent to all 589 Extension educators. Two follow-up email messages were sent to non-responders. In total, 202 Extension educators completed the survey, for a response rate of 34%. Based on procedures suggested by Miller and Smith (1983), early (those who responded to the survey within the 21 day deadline) and late (those who responded to two follow-up efforts after the 21-day deadline) respondents were compared. No significant differences ($p > .05$) were found between early and late respondents on key variables (the 21 local food system issues) in the study.

Data were analyzed using descriptive and inferential statistics. According to Oliver and Hinkle (1981), parametric tests can be used when a population is treated as a sample, especially with the presence of other populations with the same characteristics. Using this justification, the current population of Extension educators in the three states serves as a "slice of life" (Oliver & Hinkle, 1981) sample of all Extension educators.

Principal factor analysis was used to identify the factors underlying educators' perceptions of the LFS, and Pearson's correlation tests were computed to describe the relationships among the factors. The Statistical Package for Social Sciences (SPSS 16.0) was used to analyze all data.

Results

Objective 1: Demographic Profile

Across the three states, 39.6% of the respondents were from New Jersey, 19.8% were from New York, and 40.6% were from Pennsylvania. Over three-fifths (61.8%) of the respondents were female. Nearly one-half (45.9%) indicated that agricultural and natural resources is the program area in which they spend the greatest amount of time. This was followed by family and consumer sciences (28.8%), 4-H and youth development (19.7%), and community development (5.6%). A little more than two-thirds of the respondents (70.6%) reported having a graduate degree (masters/doctorate) as their highest educational level.

Over three-fourths of the educators indicated that their participation in LFS activities/issues was moderate (42.2%) to slight (35.2%). Just 15.1% indicated extensive participation; 7.56% indicated no participation. Asked if they had received training on specific food system topics, a significant number (69.8%) had participated in food safety training, a priority across the Extension system. More respondents have received training in public issues education related to food and agriculture issues (56.9%) than on marketing locally grown and processed foods (39.6%) or local agriculture-related business (39.6%) topics. See Table 1 for a complete profile of Extension educators in New Jersey, New York, and Pennsylvania.

Table 1.
Profile of Extension Educators in New Jersey, New York, and Pennsylvania

Variable	Category	n	%

State	New Jersey	80	39.6
	New York	40	19.8
	Pennsylvania	82	40.6
	Total	202	
Program Responsibility	Agricultural & Natural Resources	91	45.9
	4-H & Youth Development	39	19.7
	Family & Consumer Sciences	57	28.8
	Community Development	11	5.6
	Total	198	
Gender	Male	115	61.8
	Female	71	38.2
	Total	186	
Highest Education Level	Doctoral degree	10	5.1
	Masters degree	129	65.5
	Bachelors degree	52	26.4
	Other	6	3.0
	Total	197	
Participation in LFS Activities	Extensive	30	15.1
	Moderate	84	42.2
	Slight	70	35.2
	None	15	7.5
	Total	199	
Food Systems Training[a]	Marketing locally grown & processed foods	80	39.6
	Local ag-related business	80	39.6
	Food safety	141	69.8
	Public issues education related to food & agricultural	115	56.9

	issues		
[a]Single item responses			

Objective 2: Factors Underlying Educators' Perceptions of the LFS

To obtain Extension educators' perspectives on LFS issues, educators were asked to indicate on a five-point Likert scale the importance (1=very unimportant; 5=very important) of 21 issues related to LFS programming. Mean scores for the 21 issues ranged from a high of 4.49 (*SD*=0.75) to a low of 3.80 (*SD*=1.32), a spread of only 0.69. The issue, *viable local ag-related businesses* (4.49), was perceived as "very important," followed closely by *consumer food safety* (*M*=4.46; *SD*=0.75) and *farmland preservation* (*M*=4.46; *SD*=0.86). Topics perceived as less important, *ordinances restricting local farming* (*M*=3.80; *SD*=1.32) and *globalization of food system* (*M*=3.84; *SD*=1.10) were each still perceived as "important." Extension educators, in fact, perceived all of the 21 issues "important" to LFS programming. For means and standard deviations for all of the food systems topics, refer to Table 2.

Principal factor analysis was performed to identify factors that underlie the importance of LFS issues within communities. To report factor analysis data, the procedures suggested by Warmbrod (2000) were used. Factors with Eigen values greater than 1 were retained and rotated to a varimax solution for interpretation. In addition, Cronbach's alpha for each extracted factor was reported. Factor analysis extracted five factors, accounting for 60.61% of the total variance. Internal consistency estimates were computed for the five factors by examining the factor loadings and the items that loaded on each of the five factors. Reliability estimates for each factor ranged from a high of 0.835 for Factor 1 to a low of 0.675 for Factor 4 (Table 2).

The variables that loaded on each of the five factors were given to a panel of experts to "name" each factor. The naming of factors facilitates interpretations of statements that go together (loaded) on each factor based on factor analysis results. The panel consisted of individuals actively engaged in food systems research and education. Based on the expert panel's judgments, the five factors explaining food system initiatives at the community level were named:

- Factor 1 â— Food Access
- Factor 2 â— Food System Viability
- Factor 3 â— Localization of Food Systems
- Factor 4 â— Food Safety
- Factor 5 â— Land Use

Table 2.
Mean, Standard Deviation, and Explained Variance for Food System Topics by Factor

Factor	Topic	M[a]	SD	r
Factor 1: Food Access (31.77%) Eigen Value = 6.67 Reliability = 0.83	Hunger	4.08	0.99	0.662
	Access to quality food by all economic groups	4.34	0.81	0.618
	Access to healthy food at restaurant & other public places	4.30	0.85	0.663
	Access to grocery stores	4.19	0.94	0.667
	Loss of food preparation skills	4.07	1.09	0.555
Factor 2: Food System Viability (11.70%) Eigen Value = 2.46 Reliability = 0.72	Globalization of food system	3.84	1.10	0.410
	Loss of family-owned farms	4.34	0.93	0.606
	Transfer of farm ownership	3.92	1.12	0.617
	Community participation in food & agriculture	4.26	0.84	0.562
	Viable local ag-related businesses	4.49	0.75	0.631
	Ordinances restricting local farming	3.80	1.32	0.361
Factor 3: Localization of Food Systems (6.78%) Eigen Value = 1.42 Reliability = 0.74	Consumers' awareness of locally grown food	4.47	0.69	0.750
	Institutional use of local foods	4.00	0.85	0.652
	Access to locally grown foods	4.42	0.74	0.731
	Existence of local food processors	3.90	0.99	0.532
Factor 4: Food Safety (5.27%) Eigen Value = 1.10 Reliability = 0.67	Consumer food safety	4.46	0.75	0.562
	Bioterrorism in food supply	3.99	0.88	0.616
	Ability to respond to natural disasters	4.34	0.72	0.595
Factor 5: Land Use (5.09%) Eigen Value = 1.07 Reliability = 0.71	Land use planning	4.41	0.83	0.676
	Local waste management	4.15	0.80	0.554
	Farmland preservation	4.46	0.86	0.708

[a]Mean computed on a scale 1 = very unimportant to 5 = very important
Numbers in parentheses indicate variance explained by each factor

Factor 1 (*Food Access*) explained 31.77% of the total variance. Five variables loaded on this factor. The variable, *access to grocery stores*, was most representative of Factor 1 ($r = 0.667$). Factor 2 (*Food System Viability*) explained 11.70% of the total variance. Six variables loaded on this factor. The variable, *viable local ag-related businesses*, was most representative of this factor ($r = 0.631$). Factor 3 (*Localization of Food Systems*) explained 6.78% of the variance. Four variables loaded on this factor. The statement, *consumers'*

awareness of locally grown food, was most representative of Factor 3 ($r = 0.75$). Factor 4 (*Food Safety*) explained 5.27% of the total variance. On this factor, three variables loaded. The variable, *bioterrorism in food supply*, was the most representative of Factor 4 ($r = 0.616$). Finally, factor 5 (*Land Use*) explained 5.09% of the variance. Three variables loaded on this factor. The statement, *farmland preservation*, was the most representative of Factor 5 ($r = 0.708$). For complete results of the variance explained, Eigen values and factor reliabilities, see Table 2.

Table 3 presents inter-correlations among the five factors extracted by principal component factor analysis. Using the scale provided by Davis (1971), all of the relationships are positive and moderate to substantial in strength. These significant inter-correlations suggest that the five factors share a common underlying construct that is based on LFS issues. Further, none of the correlations were over .70, suggesting multicollinearity is not a problem.

Table 3.
Inter-Correlations Among Five Factors Extracted by Principal Factor Analysis (N=202)

	Mean[a]	SD	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Factor 1	4.20	0.93	-	.265**	.468**	.475**	.376**
Factor 2	4.11	1.01		-	.497**	.354**	.558**
Factor 3	4.20	0.82			-	.385**	.489**
Factor 4	4.26	0.78				-	.375**
Factor 5	4.34	0.83					-
[a]Mean computed on a scale 1 = very unimportant to 5 = very important **p<0.001							

Objective 3: Differences Between Educators' LFS Perceptions and Demographic Characteristics

Educators' views on the importance of LFS issues did not vary by educational level. However, female educators perceived Factor 1 (food access) to be significantly more important ($p < 0.001$) than did their male counterparts (Table 4). No differences existed by gender and the other factors.

Table 4.
T-Test Results for Importance of Local Food System Factors by Gender

Factor	Gender	N	M[a]	SD	Mean Difference	T-Value
Factor 1: Food Access	Male	71	19.11	4.10	3.17	6.24**
	Female	115	22.29	2.82		
Factor 2: Food System Viability	Male	71	24.99	3.98	-5.77	-0.96
	Female	115	24.41	3.95		

Factor 3: Localization of Food Systems	Male	71	16.61	2.76	0.26	0.69
	Female	115	16.87	2.33		
Factor 4: Food Safety	Male	71	12.52	2.01	3.17	1.88
	Female	115	13.03	1.68		
Factor 5: Land Use	Male	71	12.99	1.94	3.17	-0.12
	Female	115	12.95	2.07		

** p < 0.001
[a]Mean computed on a scale from 1= very unimportant to 5=very important;
Factor 1: mean could range from a low of 5 to a high of 25 with a theoretical midpoint of 15
Factor 2: mean could range from a low of 6 to a high of 30 with a theoretical midpoint of 18
Factor 3: mean could range from a low of 4 to a high of 20 with a theoretical midpoint of 12
Factor 4: mean could range from a low of 3 to a high of 15 with a theoretical midpoint of 9
Factor 5: mean scores could range from a low of 3 to a high of 15 with a midpoint of 9

Pronounced differences occurred across factors by educators' area of primary program responsibility (Table 5). Family and consumer science educators perceived food access (Factor 1) to be significantly more important ($p < 0.001$) than did their counterparts in agricultural and natural resources. Just the opposite occurred for food system viability (Factor 2); agricultural and natural resource educators perceived food system viability (Factor 2) significantly more important than did their counterparts in family and consumer science ($p < 0.001$). Community development educators placed more importance on the localization of food systems (Factor 3) than did their colleagues with other primary program responsibilities. Family and consumer science educators also perceived food safety (Factor 4) to be significantly more important than did their colleagues in 4-H/youth development ($p < 0.05$). There were no significant differences in the importance of land use (Factor 5) by educators' area of primary program responsibility.

Table 5.
ANOVA Results for Importance of LFS Factors by Primary Program Responsibility

Factor	**Primary Area of Program Responsibility**	**N**	**M[a]**	**SD**	**F-Value**
Factor 1: Food Access	Agricultural & Natural Resources	91	19.32	4.07	18.88**
	4-H & Youth Development	39	21.56	2.79	
	Family & Consumer Sciences	57	23.40	1.97	
	Community Development	11	20.82	2.27	

Factor 2: Food System Viability	Agricultural & Natural Resources	91	25.75	3.48	4.96**
	4-H & Youth Development	39	24.46	4.45	
	Family & Consumer Sciences	57	23.28	3.82	
	Community Development	11	24.45	4.18	
Factor 3: Localization of Food Systems	Agricultural & Natural Resources	91	16.88	2.46	0.88**
	4-H & Youth Development	39	16.26	2.91	
	Family & Consumer Sciences	57	17.02	2.26	
	Community Development	11	17.18	2.32	
Factor 4: Food Safety	Agricultural & Natural Resources	91	12.47	1.95	2.74*
	4-H & Youth Development	39	13.08	1.83	
	Family & Consumer Sciences	57	13.25	1.57	
	Community Development	11	12.27	1.79	
Factor 5: Land Use	Agricultural & Natural Resources	91	13.05	1.90	0.19
	4-H & Youth Development	39	13.18	2.58	
	Family & Consumer Sciences	57	12.88	1.79	
	Community Development	11	13.00	1.73	

* $p < 0.05$; ** $p < 0.001$
[a]Mean computed on a scale from 1= very unimportant to 5=very important;
Factor 1: mean could range from a low of 5 to a high of 25 with a theoretical midpoint of 15
Factor 2: mean could range from a low of 6 to a high of 30 with a theoretical midpoint of 18
Factor 3: mean could range from a low of 4 to a high of 20 with a theoretical midpoint of 12
Factor 4: mean could range from a low of 3 to a high of 15 with a theoretical midpoint of 9
Factor 5: mean scores could range from a low of 3 to a high of 15 with a midpoint of 9

Prior participation in LFS programming also significantly influenced educators' perceptions regarding the importance of LFS issues (Table 6). Those indicating extensive participation in the LFS viewed Factor 2

(food system viability) and Factor 3 (localization of local food systems) significantly more important ($p < 0.001$; $p < 0.05$ respectively) than did those reporting less prior participation.

Table 6.
ANOVA Results for Importance of LFS Factors by Participation in LFS Activities

Factor	Participation in LFS Activities	N	M[a]	SD	F-Value
Factor 1: Food Access	Extensive	30	20.37	4.27	0.78
	Moderate	84	21.46	3.90	
	Slight	70	20.86	3.20	
	None	15	20.93	3.60	
Factor 2: Food System Viability	Extensive	30	26.53	2.47	5.58**
	Moderate	84	24.83	3.78	
	Slight	70	24.39	4.15	
	None	15	21.73	4.30	
Factor 3: Localization of Food Systems	Extensive	30	17.80	1.79	4.69*
	Moderate	84	17.07	2.49	
	Slight	70	16.36	2.50	
	None	15	15.33	2.66	
Factor 4: Food Safety	Extensive	30	12.83	1.64	0.82
	Moderate	84	13.02	1.80	
	Slight	70	12.66	1.82	
	None	15	12.40	2.10	
Factor 5: Land Use	Extensive	30	13.33	1.71	2.34
	Moderate	84	12.83	1.97	
	Slight	70	13.31	1.93	
	None	15	12.00	2.65	

* $p < 0.05$; ** $p < 0.001$
[a]Mean computed on a scale from 1= very unimportant to 5=very important;
Factor 1: mean could range from a low of 5 to a high of 25 with a theoretical midpoint of 15
Factor 2: mean could range from a low of 6 to a high of 30 with a theoretical midpoint of 18
Factor 3: mean could range from a low of 4 to a high of 20 with a theoretical midpoint of 12

Factor 4: mean could range from a low of 3 to a high of 15 with a theoretical midpoint of 9
Factor 5: mean scores could range from a low of 3 to a high of 15 with a midpoint of 9

Conclusions and Implications

Previous research has proposed a framework to strengthen community engagement and LFS programming through Extension at the field level (Thomson, Radhakrishna, Maretzki, & Inciong, 2006). In collaborating with a community, Extension educators must understand the importance of LFS topics within the community in order to define strategies to successfully strengthen the community's social and economic sustainability, enhancing the community's civic life. However, this understanding also must include a self-reflexive process through which Extension educators account for their own perceptions regarding the importance of LFS topics.

Findings from the study reported here indicate that differences among Extension educators in terms of their gender, area of primary program responsibility, and previous participation in the food system need to be understood. Such differences provide opportunities for Extension to maximize its contributions within communities. Whether educators bring technical knowledge and/or facilitation skills to the conversation, different perceptions among educators regarding the importance of these issues must be acknowledged and valued among colleagues. The focus of Extension educators needs to be building community, not competition among colleagues fueled by differing perspectives of the LFS.

Therefore, factors underlying the food system provide a framework through which to articulate common issues within communities so that individuals and organizations can collaborate to address issues around common foci that are perceived to be more important. Factors such as food access and localization of food systems can help those within communities define the programs and policies on which to build mutually beneficial community-based networks. Whether or not a community or a region is re-localizing its food system, these factors suggest what education and program initiatives would be expected to have the most impact.

The limited participation in LFS programs/activities that Extension educators indicated suggests that those in Extension's leadership need to better articulate the integral role and scope of the food and fiber system in the organization's plan of work. The intertwinement of agriculture and community sustainability is too often overlooked. An understanding that agriculture encompasses the totality of the food system from the ground to food citizens through waste management (Dahlberg, 1994) must be developed among all Extension educators.

Both personal interest in an issue as well as professional responsibilities outlined by Extension's leadership influence an individual's enthusiasm and commitment to LFS work. To address LFS issues, Extension educators must also be knowledgeable about such issues. In a study of Florida educators, Adams, Place, and Swisher (2009) found that although fairly similar, knowledge levels among agents did vary across program areas. Communities can use the factors underlying the food system that have been identified in the study reported here to define priorities among those involved.

Extension administrators in the three states should share the findings of the study to make informed decisions about LFS programming. The decisions could be in the areas of 1) a stronger emphasis on LFS programs in the plan of work document, 2) providing additional support for LFS programming, 3) incentives for

educators to engage in interdisciplinary work to address LFS issues and 4) a shared understanding and well-articulated vision for LFS programming in the three states. Using the findings in this manner can strengthen the economic and social vitality of the LFS in a community.

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