Extension Education Methods

Knowledge Change and Donation Intentions of Field Day Attendees

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ADDITIONAL INDEX WORDS. citizen science, extension, food security, garden, Master Gardener, survey

SUMMARY. Participation in field days increases adoption of new techniques and fosters learning. Since 1977, the Iowa State University (ISU) Department of Horticulture has hosted several Home Demonstration Garden (HDG) field days at ISU research farms each year to educate consumers on best practices and cultivars for growing annual flowers and vegetables. Gardens are planted at the farms and feature a specific topic or theme. In 2016 and 2017, 12 HDG field days were hosted in July or August. The objective of these field days was to showcase cultivars of vegetables that are in demand at food pantries and that home gardeners could grow easily for donation to these pantries. In addition to showcasing crops, presentations were delivered that focused on food insecurity implications in Iowa and how community members could impact food security locally. Of more than 400 field-day attendees in 2016, 151 (38%) participated in an optional survey at the end of the day. Similarly, in 2017, 140 of 350 (40%) attendees participated in the survey. Participants reflected on their food security knowledge and intentions to donate fresh produce before and after participation in the field day. Slightly more than a third (39.53% and 37.12%, respectively) of attendees reported some increase in food-security knowledge after participation. In addition, 85% and 72.5% of respondents reported that they will or would consider donating fresh produce to a local pantry after participation in this field day in 2016 and 2017, respectively. This was a change of more than 40% from previous donation patterns in both years. Results from this study are being used to focus future programming of the HDG field days and content of the field day surveys.

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Food security is defined by the U.S. Department of Agriculture (USDA) as not always having access to foods that promote a healthful and active lifestyle. It affected more than 10.6%, or 331,000, Iowans annually between 2013 and 2015 (USDA, 2017). Food insecurity is most prevalent in rural areas compared both to urban and suburban areas of the country (USDA, 2017). Decreasing the prevalence of food insecurity is a paramount issue for Iowans (Garasky et al., 2004). One way for community members to

engage with food-security projects is by participating in a produce-donation project, such as Plant a Row for the Hungry (Garden Writers Association, 2018).

In addition to physically gardening as a means of increasing awareness of food security, field days have been shown to increase the dissemination of information, as well as elicit adoption of new strategies or practices after the field days conclude (Diehl et al., 2012; Miller et al., 2016). The purpose of field days is to showcase or demonstrate specific practices to attendees (Shepard, 2001). Across the United States, those who participate in field days have identified as predominately male, moderately wealthy, from rural locations, and over age 45 years (Comito et al., 2018; Diehl et al., 2012; Miller et al., 2016).

A pilot partnership between the Supplemental Nutrition Assistance Program—Education (SNAP-Ed) and the Iowa Master Gardener (IMG) program was created to address hunger in Iowa by increasing access to fresh produce by those who are food insecure. One aspect of the SNAP-ED and IMG research project partnership focused on donation gardening and how this partnership can increase awareness of food security in Iowa.

The Iowa State University Research and Demonstration Farms were the host sites for 12 Home Demonstration Garden field days in 2016 and 2017. The HDGs were started in 1977 and have focused on showcasing new cultivars of edible and ornamental crops. Annually, more than 300 community members attend these field days in Iowa. The theme of the 2016 and 2017 HDGs was food pantry donation gardening, and as a result, the gardens were planted with cultivars of common vegetables and fruits that were specifically requested by Iowa food pantries (C. Hradek, personal communication).

No data previously existed on the change in knowledge or demographics of the HDG field day attendees. The objectives of this study were to identify the demographics of field-day attendees and their change in knowledge and in comfort discussing food security with those who are food insecure. This information allows for field-day coordinators to better tailor their promotion of field days and

increase food-security promoting projects in Iowa.

Materials and methods

SURVEY INSTRUMENT DEVELOPMENT. Survey instruments were developed in June 2016 and June 2017. The research project was reviewed and determined exempt through ISU's Institutional Review Board (IRB 16-302 and IRB 17-255) before survey distribution. The survey instruments were reviewed for content by survey and research professionals.

The primary objectives of these surveys were to determine relative knowledge gain about food security and change in comfort level of discussing food security in Iowa after participation in 1 of 12 HDG field

days. A secondary objective was to analyze interactions between demographics and patterns of donation of fresh produce to pantries. The data collected will influence how food-insecurity information is presented and how community members can increase pounds of donations of fresh produce to local pantries.

The first-year (2016) survey consisted of 15 questions: 12 closed-ended and 3 open-ended. Two questions addressed the primary objective. These questions were based on a four-point scale ranging from "none" to "a lot." Two questions addressed the secondary objective: previous donation and projected donation of produce to a food pantry. The response options were "yes," "no," and "maybe." Two questions were used to identify how the attendees heard about the field day

and if attendees were aware of food pantries in the area. Nine demographic questions were also included in the survey.

Minor changes were made to the second-year (2017) survey to improve clarity. The second-year survey consisted of 19 questions: 15 closed-ended and 4 open-ended. The same two questions from the 2016 survey were used to address the primary objective. Four questions addressed the secondary objective. Two used a four-point scale of "none" to "a lot," one was open-ended, and the fourth used a four-point scale ranging from "not at all likely" to "very likely." Three questions were used to identify how the attendees heard about the field day, if attendees were aware of food pantries in the area, and if they planned to grow cultivars from the HDG in their own gardens the next season. Ten demographic questions served as controls for the six primary and secondary questions.

DATA COLLECTION. Printed surveys and consent forms were administered to attendees after field-day presentations at the six HDGs on the following dates: 19 and 28 July and 2, 4, 6, and 9 Aug. 2016; and 20 July and 1, 2, 3, and 5 Aug. 2017. Field-day attendees voluntarily completed the surveys and could skip any questions. Two envelopes were used to separate consent forms and surveys to keep identities of the attendees anonymous. Of the 400 attendees in 2016, 151 completed the survey. Of the 350 attendees in 2017, 140 completed the survey. According to standards established by the American Association of Public Opinion Research (2008) the response rates were 60.2% and 40%, respectively.

DATA ANALYSIS. Data were coded in Excel (Office 365; Microsoft Corp., Redmond, WA) and analyzed with statistical software (SAS version 9.4; SAS Institute, Cary, NC). Data addressing knowledge gain and comfort change about food security were analyzed with chi-square and Wilcoxon signed-rank tests. Data on pantry donations were analyzed using chi-square to determine interactions among the donation and demographic questions. The "yes" and "maybe" responses about donation patterns were combined in 2016. The 2017 question related to food-security activities was coded and then

Table 1. Frequency and percentage of age, area of residence, race, gender, household number, and income of Home Demonstration Garden field-day attendees in Iowa in 2016 and 2017.

	2016 Attendees		2017 Attendees	
	(no.)	(%)	(no.)	(%)
Age (years)				
18–24	6	4.08	3	2.22
25–34	7	4.76	7	5.18
35–44	11	7.48	2	1.48
45–54	3	2.04	9	6.67
55–64	34	23.13	36	26.67
65+	86	58.51	78	57.78
Area of residence				
Rural	90	61.23	89	66.42
Suburban	44	29.93	20	14.92
Urban	13	8.84	25	18.66
Race				
White	138	95.83	125	96.15
Black	1	0.70	1	0.77
Hispanic	2	1.39	0	0.00
Other	3	2.08	4	3.08
Gender				
Male	54	36.49	52	39.39
Female	94	63.51	80	60.61
Households (no.)				
1	30	20.13	26	19.40
2	89	59.73	89	66.42
3	14	9.40	11	8.21
4	8	5.37	3	2.24
5+	8	5.37	5	3.73
Income (\$)				
<25,000	5	4.46	13	11.11
25–34,999	17	15.18	23	19.66
35–49,999	16	14.29	19	16.24
50–74,999	25	22.32	22	18.80
75–99,999	21	18.75	19	16.24
100–149,999	22	19.64	12	10.26
150,000+	6	5.36	9	7.69

grouped into three emergent themes according to Saldana's (2013) process for themeing [sic] data. Frequencies were used to represent all demographic data and the food-security activity data. Cronbach's alpha scores of 0.77 and 0.80 were found for 2016 and 2017, respectively.

Results

DEMOGRAPHICS. The survey results presented in Table 1 show that HDG field-day attendees are predominantly female (63.51% and 60.61%), white (95.83% and 96.15%), and older than 64 years (58.51% and 57.78%). Most of the attendees (61.23% and 66.42%) are from rural communities, populations of <2500 people, and live in households with one other person (59.73% and 66.42%). The median annual income in both 2016 and 2017 was between \$50,000 and \$74,999. These demographics are similar to the demographics of Extension Master Gardeners (EMGs) in Iowa, Missouri, and nationally, who identify as white, older than 45 years, and moderately wealthy (Dorn et al., 2018; Schrock et al., 1999; Takle et al., 2017).

The majority of field-day attendees have a fruit/vegetable garden at home (81.88% and 88.57%) (Table 2). Only 16% of attendees in 2016 reported being an EMG, whereas 42.03% in 2017 identified as an EMG. More than 90% of attendees in 2016 indicated that there are 0 to 5 pantries within 20 miles (32.2 km) of their homes, whereas only 81.29% in 2017 indicated 0 to 5 pantries near their homes. In 2017, more than 29% of the attendees responded that they had never attended a field-day before. Most of the attendees learned about the field day through personal contact with a friend, family member, EMG, or garden club member.

KNOWLEDGE GAIN. By using Wilcoxon signed-rank tests, we found that participation in these field days increased participants' knowledge of food security both in 2016 and 2017 ($S < 0.0001$). In 2016 and 2017, more than one-third of the participants (39.53% and 37.12%, respectively) indicated they had an increase in knowledge about food security (Table 3). The mean score for knowledge of food security (3.53) was greater in 2016, whereas 2017

showed lower means before and after with an overall smaller change between the means. More than 80% of attendees in both years indicated that they knew somewhat to a lot about food security after participating in the field days.

COMFORT CHANGE. A Wilcoxon signed-rank test found a difference between attendees' comfort in discussing food security with those who are food insecure before and after attending the field day both in 2016 and 2017 [$S < 0.0001$ (Table 4)]. The means of attendees' comfort with discussing food security with those who are food insecure increased from 2.67 to 3.13 and 2.39 to 2.85 in 2016 and 2017, respectively. More than 89% of attendees in 2016 and 70% of attendees in 2017 indicated they had some to a lot of comfort in discussing food security.

DONATION PATTERN. A chi-square test found an interaction between status as an EMG at an ISU HDG and future intention to donate produce to a food pantry in 2016 [$P < 0.03$ (Table 5)]. In 2016, more than 56% of EMGs reported donating to food pantries before participating in the field days, whereas 37% of non-EMGs donated. No interactions between being an EMG and donation were found in 2017. However, nearly 80% of EMGs intended to donate fresh produce to a local pantry, with only 69% of non-EMGs indicating donation intentions afterward. Non-EMGs with gardens were more likely than non-EMGs without gardens to have donated fresh produce to a pantry before the field days ($P < 0.04$).

In 2016, more than 50% of males and 35% of females donated produce to food pantries before the field day, with both groups increasing their overall intentions of donating fresh produce in the future [83.02% and 87.91%, respectively (Table 6)]. Donation intentions more than doubled both in males and females in 2017.

Having a fruit or vegetable garden at home did not interact with donation patterns in 2016 (Table 6). In 2017, attendees with gardens were more likely to have donated produce in the past than attendees without a garden ($P < 0.01$). Intentions to donate more than doubled for attendees regardless of whether they had a garden at home.

Table 2. Frequency and percentage of Extension Master Gardener (EMG) status, having a fruit/vegetable garden, prior field-day attendance, referral method, and number of pantries identified by Home Demonstration Garden field-day attendees in Iowa in 2016 and 2017.

	2016 Attendees		2017 Attendees	
	(no.)	(%)	(no.)	(%)
EMG				
Yes	24	16.00	58	42.03
No	126	84.00	80	57.97
Home garden				
Yes	122	81.88	124	88.57
No	27	18.12	16	11.43
Field-day attendance (no.)				
0	—	—	39	29.10
1–2	75	51.02	37	27.61
3–4	27	18.37	20	14.93
5+	45	30.61	38	28.36
Referred by				
Friend or family	40	22.60	28	17.18
Promo/flyer	33	18.64	27	16.56
Radio or news	18	10.17	13	7.98
Newspaper	30	16.95	31	19.02
Social media/website	12	6.78	10	6.13
Other	44	24.86	54	33.13
Pantries in area (no.)				
0–5	133	90.48	113	81.29
6–10	10	6.80	23	16.55
11–15	3	2.04	3	2.16
16+	1	0.68	0	0.00

Table 3. Percentages and means of knowledge change of Home Demonstration Garden field-day attendees regarding food security in Iowa in 2016 and 2017.

	Knowledge of food security			
	2016 Attendees		2017 Attendees	
	Before	After	Before	After
No.	139	131	137	135
None	10.1%	0.0%	14.6%	1.5%
Very little	18.0%	0.8%	25.5%	13.3%
Somewhat	48.9%	45.0%	46.0%	60.0%
A lot	23.0%	54.2%	13.9%	24.4%
Mean (1–4) ^z	2.85 a ^y	3.53 b	2.59 a	3.07 b

^z1 = none, 2 = very little, 3 = somewhat, 4 = a lot.

^yLetters indicate significant difference at $P < 0.0001$ using Wilcoxon signed-rank test within paired columns.

Table 4. Percentages and means of comfort change of Home Demonstration Garden field-day attendees in Iowa regarding discussing food security with someone who is food insecure in 2016 and 2017.

	Comfort of food security			
	2016 Attendees		2017 Attendees	
	Before	After	Before	After
No.	138	128	135	134
None	11.6%	2.3%	17.0%	3.0%
Very little	22.5%	8.6%	37.8%	26.1%
Somewhat	53.6%	62.5%	34.1%	53.7%
A lot	12.3%	26.6%	11.1%	17.2%
Mean (1–4) ^z	2.67 a ^y	3.13 b	2.39 a	2.85 b

^z1 = none, 2 = very little, 3 = somewhat, 4 = a lot.

^yLetters indicate significant difference at $P < 0.0001$ using Wilcoxon signed-rank test within paired columns.

Table 5. Frequencies and percentages of food pantry donation patterns for Home Demonstration Garden field-day attendees in Iowa who identified as Extension Master Gardeners (EMGs) and non-EMGs in 2016 and 2017.

	2016 Attendees			2017 Attendees		
	(no.)	Past (%)	Future (%)	(no.)	Past (%)	Future (%)
EMG status						
EMG	23	56.52	100.0 a ^z	54	40.74	79.63
Non-EMG	124	37.90	80.65 b	68	27.94	69.12
EMGs						
Garden	21	61.90	100.0	52	44.23	80.77
No garden	2	0.00	100.0	4	0.00	75.00
Non-EMGs						
Garden	99	39.39	83.84	62	32.26 a	69.35
No garden	25	32.00	68.00	9	0.00 b	44.44

^zLetters indicate significant difference at $P < 0.03$ and $P < 0.04$ using a chi-square test within groups.

Attendees who identified more than five pantries within 20 miles of their homes were more likely to have donated fresh produce to a pantry in 2016 than those who identified 0 to 5 pantries (Table 6). No differences between number of pantries and donation patterns were found in 2017.

No interaction between age and donation patterns was found either in 2016 or 2017. Donation intentions nearly doubled both in 2016

and 2017 for attendees older than 65 years.

An interaction between area of residence and future donation intentions existed in 2016 [$P < 0.04$ (Table 6)], whereas no interaction existed between area of residence and past donation patterns. No differences in donation intention by area of residence were found in 2017; however, a 28% to 44% increase in donation intention was indicated by the participants in each area of residence.

ACTIVITIES. In 2017, field-day attendees were asked about activities they could engage in to increase food security in their communities (data not reported). The mean likelihood of participants indicating working at/with a pantry or donating produce to a pantry was 3.38, which was 0.15 and 0.34 points higher than engaging in education-related activities and gardening activities, respectively. The majority (55.17%) indicated intentions to work with a pantry, while less than a quarter (22.41%) responded with education-related activities as actions they could engage in to increase food-security.

Discussion

DEMOGRAPHICS. Overall, the demographics of the HDG field-day participants, overwhelmingly female and over age 65 years, differed greatly from field-day attendee demographics nationally, which are prevalently male-dominated (Comito et al., 2018; Diehl et al., 2012; Miller et al., 2016). HDG attendees had some similarities with other field-day attendees in Iowa; they were white, moderately wealthy, and preferred word-of-mouth, newspaper ads, and promotional flyers as forms of publicity (Comito et al., 2018).

KNOWLEDGE GAIN. The percentage of the field-day attendees who learned something about food security-related issues in Iowa indicates that the field days were an effective technique in educating the public. Other researchers with similar styles of field days have shown success in increasing knowledge for the attendees (Diehl et al., 2012; Miller et al., 2016). The success of the HDG field days was due to the attendees hearing and seeing simple practices on increasing food security and having the opportunity to discuss with others currently involved in the HDG project. This is similar to the field-day success loop for all field days (Comito et al., 2017). The smaller change in knowledge gain in 2017 compared with 2016 may have occurred if the 2017 attendees attended the 2016 field days or if the attendees had a higher level of knowledge before attending the field days than the 2016 attendees. The 2017 attendees may also have

Table 6. Frequencies and percentages of food pantry donation patterns based on gender, garden, number of nearby pantries, age, and area of residence for Home Demonstration Garden field-day attendees in Iowa in 2016 and 2017.

	2016 Attendees			2017 Attendees		
	(no.)	Past (%)	Future (%)	(no.)	Past (%)	Future (%)
Gender						
Male	53	50.94	83.02	51	35.29	78.43
Female	91	35.16	87.91	72	30.56	69.44
Garden						
Yes	120	43.33	86.67	110	37.27 a	75.00
No	26	30.77	76.92	12	0.00 b	46.15
Pantries in area (no.)						
0–5	131	36.64 a ²	85.50	102	32.35	69.61
6–10	9	66.67 b	66.67	23	36.13	86.96
11–15	3	100.00 b	100.0	3	0.00	66.67
16+	1	100.00 b	100.0	—	—	—
Age (years)						
18–24	6	0.00	100.0	3	0.00	100.0
25–34	7	28.57	100.0	5	0.00	80.00
35–44	11	36.36	100.0	2	50.00	100.0
45–54	3	66.67	100.0	8	12.50	87.50
55–64	34	35.29	91.18	33	36.36	66.67
65+	82	43.90	76.83	73	36.99	72.60
Area of residence						
Rural	89	38.20	82.02 a	83	30.12	74.70
Suburban	41	41.46	95.12 a	19	36.84	63.16
Urban	13	46.15	69.23 b	22	40.91	81.82

²Letters indicate significant difference at $P < 0.01$, $P < 0.03$, and $P < 0.04$ using chi-square tests within groups.

previously volunteered at or donated produce to a food pantry in their community, which would explain the smaller change in knowledge. As a statewide initiative in both 2016 and 2017, EMG trainings focused on food security. The higher percentage of EMGs who completed the surveys in 2017 may have had increased exposure to food security-related education outside of the field days.

COMFORT CHANGE. Allen et al. (2017) found an increase in comfort in teaching after participation in a 1-day workshop, which aligns with the field-day attendees' increase in comfort discussing food security with those who are food insecure. The comfort level of attendees in discussing food security with those who are food insecure increased both in 2016 and 2017, which suggests that the attendees had more knowledge on the subject and were more able to communicate about food security because of their participation in the HDG field day. In 2016 and 2017, respectively, 60% and 62% of respondents reported no increase in comfort in discussing food security (data not reported). The majority of those with

no increase in comfort reported having some to a lot of comfort in discussing food security.

DONATION PATTERN. Blaine et al. (2010) found that 32% of community gardeners in Cleveland, OH, donated produce to food banks and shelters, which is lower than the 41.06% of field-day attendees who had donated to food pantries before the HDG field day. The only demographic questions that interacted with donation intention in 2016 were identifying more than five pantries within 20 miles of the participant's home, living in a rural or suburban location and status as an EMG. In 2017, having a garden was the only demographic factor that interacted with donation intention. The increased number of nearby pantries directly relates to donation history, which indicates that a limited number of pantries will not hinder field-day attendees from potentially donating fresh produce in the future. The interaction between place of residence and donation may have occurred due to the location of the HDGs. These gardens were located in rural areas before this project, so more rural residents have been indirectly targeted.

IMGs are required to complete 10 h of continuing education annually. Six hours of food security-related webinars were recorded and released for EMGs to watch before the 2016 field season. The webinars may have influenced the donation intentions of EMGs, which partially explains why being an EMG interacted with donation patterns. This increase in EMGs intending to donate fresh produce may have carried over into the 2017 season, so no interaction was found between their intentions to donate and being an EMG. This is in agreement with McFarland et al. (2018), who concluded that EMGs have distinct motivations for gardening compared with gardeners in general.

There was a 44% increase, from 41% to 85%, of respondents who intended to donate fresh produce in 2016. Having a vegetable garden did not affect whether attendees donated to food pantries before the field days in 2016, which suggests that attendees donated items that are not grown from a garden. Hoisington et al. (2002) found that access to and consumption of fresh produce are particular concerns for food pantry users in Washington. In 2017, we

found that attendees who identified as having a fruit/vegetable garden had been more likely to donate produce before the field days. The intention to donate indicates that the field days were effective in educating the public about pantry gardens and that food pantries in their area accept fresh produce, as well as the importance of contributing to food security in their local communities.

ACTIVITIES. Although only 40% of the attendees completed both questions related to food security activities, we found that those who identified activities they could engage in were more likely to intend to donate to or volunteer at a food pantry. The intentions of the attendees on educating others about food security or growing a personal/community donation garden were lower than food pantry-related activities. This suggests the attendees heavily swayed toward altruistic motives, which aligns closely with the motivations of IMGs (Takle et al., 2016).

We achieved the original goals of determining whether participation in a HDG field day increases knowledge and comfort in discussing food security, as well as identifying which demographic characteristics influence pantry donation intentions. This study highlights the importance of surveying knowledge and intentions after participating in a field day. Although a limitation of this study was not having a strong gardener-to-gardener connection during the field days, future programming can be altered to improve the layout of the field-day discussions (Comito et al., 2017). Researchers and field-day coordinators may use these findings to generate surveys to measure knowledge and impact in food security-related fields, to better engage with local food pantries and to collect post-field-day

donation adoption data to further explain the impact of the field days.

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