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Assessing science-based practices for safe-home food preservation (FP) can prevent unnecessary foodborne illness. An Extension program called Grow It, Eat It, Preserve It allows trained Extension agents to teach and advise on FP topics. Meanwhile, the Home & Garden Information Center delivers science-based gardening education, supporting the Master Gardener Volunteer Program (MG), increasing community outreach. MGs conduct the Grow It, Eat It, Preserve It partner program, Grow It Eat It, which teaches residents to grow edible gardens. MGs are not legally trained in FP, and a knowledge gap exists regarding how often MGs are asked FP questions during community events and what resources they provide to clients. An online survey was administered to 1,810 active MGs in Maryland, providing insight on MGs' current knowledge and community interactions pertaining to FP. A total of 586 MGs responded to the survey. Results indicated that MGs were asked FP questions during community events (65.5%) and often went beyond the scope of their training to provide non-Extension resources for FP. Most MGs were unsure whether FP workshops took place in their county Extension office (65.8%). The survey results can improve cross-programming communication and inform future MG training, marketing, and programming.

Keywords: food preservation, Master Gardeners, Family & Consumer Sciences, volunteers

Introduction

Since 1978, Maryland has used Master Gardener (MG) volunteers and the Home & Garden Information Center (HGIC) to extend community outreach on science-based home gardening practices. Grow It Eat It (GIEI) is a subprogram of the MG program that encourages and teaches residents to create and maintain edible gardens (University of Maryland Extension, 2019). The Grow It, Eat It, Preserve It (GIEIPI) program is a partnering program to GIEI, teaching residents science-based practices to safely-preserve food through freezing, dehydration, and canning. Trained employees of the university facilitate the GIEIPI programming.

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Extension has played an important role in advancing home food preservation (herein referred to as FP) in America for over 100 years (U.S. Department of Agriculture National and Agricultural Library, n.d.). Extension employees who teach FP are usually 4-H agents or Family & Consumer Sciences agents (FCS; Stage & Vincenti, 1997; Thomas & Chapman, 2014; US Department of Agriculture National Institute of Food and Agriculture, n.d.). 4-H is a national program for youth and focuses on civic engagement, health, and science (National 4-H Council, n.d.). FCS aims to improve families, farms, communities, and economic dimensions, by focusing on programs aimed at the well-being of families and the community (U.S. Department of Agriculture National Institute of Food and Agriculture, 2018).

The 4-H, FCS, and MGs programs share the outreach and education themes of food, agriculture, nutrition, sustainability, and FP. With the increasing popularity of FP (Andress et al., 2001; Camire et al., 2019; Dickerman, 2010; Lorenz et al., 2016), there are several challenges with how science-based FP information is disseminated among home preservers (D'Sa et al., 2007; Lorenz et al., 2016). In Maryland, the few 4-H and FCS agents who focus on FP have other programmatic responsibilities that limit their commitment to attend community events such as farmers markets to promote and educate on safe FP practices.

A pragmatic solution may be to have MGs help educate residents during community events because of the deep connection between growing produce and preserving produce. There are about 1,810 active MG volunteers who can reach roughly 100,000 residents in a given year (Home & Garden Information Center, 2020). Yet, the current University of Maryland Extension Master Gardener Coordinator Manual (2019) states that MGs should not answer FP questions because they are not legally covered to advise on such topics. If Maryland had the capacity to support a Master Food Preserver Volunteer Program, it would allow trained volunteers to provide science-based information in various community settings (Healthy Canning on the Foodie Pro Theme, 2020), similar to the role of trained MGs providing science-based home gardening information in the community. It is currently unknown how often MGs in Maryland are asked questions about FP, if at all, and what resources they provide clients. This gap is reflected in the lack of publications regarding how often MGs are asked FP questions in other states to support anecdotal accounts and a deficiency of general food preservation studies (Lorenz et al., 2016). Knowing to what extent MGs receive and answer FP questions can help faculty and administrators to make informed decisions regarding Extension outreach and education for FP.

Purpose of the Study

The purpose of the study was to better understand (a) how often MGs are asked FP questions during community events, (b) what FP resources they provide to clients, and (c) MG knowledge of FP activities in their county/city office.

Methods

All statewide-active MGs were recruited to participate in this study through their monthly newsletter listserv. Researchers included a brief description of the survey in the newsletter with an embedded survey link. The survey was available for four weeks, from April 16, 2018, to May 16, 2018. After two weeks, a friendly reminder went to all active MGs to encourage them to participate if they had not done so already. There were no monetary or other incentives to complete the survey.

The MG volunteer program requires all MGs to record their volunteer hours on an online platform. Therefore, using an online newsletter and survey platform, Qualtrics™ (Qualtrics, Provo, UT), was an appropriate method to administer the survey. Employing an online survey for all active MGs can maximize the research team's resources in terms of time, cost, respondent error/omission, and data analysis (O'Neill, 2004; West, 2007). MGs by state policy must be 18 years or older. The Institutional Review Board at the University of Maryland, College Park, approved this study before participant recruitment.

The online survey consisted of five items and four demographic items (Table 1) that took about five minutes for participants to complete. The survey consisted of Likert-type, multiple-choice, and fill-in-the-blank questions. The questions investigated (a) whether MGs were asked FP questions at community events, (b) what FP resources MGs provide to clients, (c) MG knowledge of FP activities in their county/city office, (d) frequently asked FP question, and (e) demographics. Survey items were developed by an FCS agent and MG Advanced Training Coordinator and reviewed by one FCS agent and one HGIC agent for face validity (Reinard, 2006).

Table 1. Survey Items

FP questions Master Gardeners are asked at community events
-As a Master Gardener, how often are you asked food preservation questions? ^a
-What is the most frequent food preservation question you are asked? ^b
FP resources Master Gardeners provide to clients
-What resources have you recommended (if any) for safe food preservation? ^b
MG knowledge of food preservation activities in their county office
-Are food preservation workshops offered by your county Extension office? ^c
-Do you know the name of the person teaching food preservation at your local Extension county office? ^b
Demographics
-County of Master Gardeners status ^c
-Year of completed Master Gardeners basic training ^b
-Age ^c
-Gender ^c

^a 5-point Likert scale from "Never" to "Constantly"

^b Fill-in-the-blank

^c Multiple-choice

Data Analysis

Surveys were analyzed using IBM SPSS Statistics version 25.0 (IBM Corp., Armonk, NY, USA) using non-parametric statistics, including frequencies and counts.

Results

The online survey was live from April to May 2018. There were 586 completed surveys, for a 32.4% completion rate by active MGs ($N = 1,810$). Respondents completed their initial MG training between 1989 and 2018. The majority identified as female (83.3%, $n = 482$) (data not shown), and most were between the ages of 65-74 years (40.2%, $n = 234$), followed by 55-64 years (28.7%, $n = 167$). Out of the 23 counties in the state and Baltimore City, the jurisdictions with the highest participation were Montgomery County (14.3%, $n = 79$), Howard County (10.9%, $n = 60$), and Anne Arundel County (9.1%, $n = 50$).

Food Preservation Questions MGs are asked at Community Events

Only 34.5% ($n = 198$) of respondents said they were *never* asked FP questions. More often, MGs did handle FP questions to some extent from the community (65.5%; $n = 376$). The question regarding their most frequent FP question solicited 265 responses. The primary FP theme focused on tomato-related topics. MGs reported that the community asked how to (a) preserve tomatoes and tomato sauce, (b) freeze and preserve herbs, (c) preserve fruits and vegetables by freezing, (d) preserve without sugar, and (e) preserve meat by canning.

Food Preservation Resources MGs Provide to Clients

Respondents recorded the various FP resources that they gave to clients during community events. There were 218 responses, and resources were grouped into different categories: Extension resources, non-Extension affiliated websites, books and magazines, other resources. Many respondents cited Extension offices and Extension websites (National Center for Home Food Preservation, which includes USDA resources). Respondents also cited a version of the *Ball Book of Canning* (copyright year and edition unknown), YouTube videos, and blogs as non-Extension-affiliated resources.

Master Gardeners' Knowledge of FP Activities in Their County/City Office

Table 2 presents responses to FP activities questions. MGs (65.8%; $n = 381$) stated that they were *unsure* if canning workshops occurred in their county/city Extension office. Those who responded that canning workshops were held in their county/city office (20.7%; $n = 120$) were asked whether they knew the name of the agent teaching FP workshops. Only 28 respondents submitted an agent's name. Some responses included retired faculty and names of faculty that did not teach FP.

Table 2. Responses to FP Activities Questions (N = 586)

Survey Item	Number (%)
As a UME Master Gardener, how often are you asked food preservation questions? ^b	
Never	198 (34.5)
Rarely	226 (39.4)
Sometimes	126 (22.0)
Often	23 (4.0)
Constantly	1 (0.2)
No response	12 (^a)
Are food preservation workshops offered by your County/City Extension office? ^c	
Yes	120 (20.7)
No	78 (13.5)
Unsure	381 (65.8)
No response	7 (^a)
If you know the person's name, please type in the name of the person who is teaching food preservation at your local Extension County/City Extension office ^d	
Their name is...	28 (26.2)
I can't remember their name	107 (73.8)

Note. ^a "No responses" and missing responses were not calculated in the total percentage.

^b Calculated as a percent of 574 respondents versus 586 respondents.

^c Calculated as a percent of 579 respondents versus 586 respondents.

^d Calculated as a percent of 107 respondents, versus 586 respondents.

Discussion

This may be the first study to publish the results of a survey identifying interactions between MGs receiving and responding to unsolicited FP topics during community events. In this study, we documented the extent that MGs received FP questions during community events, the resources MGs provided clients at that point in time, and their knowledge of FP activities in their county/city office. It was found in the present investigation that the majority of MGs were asked FP questions during community events (34.5% were *never* asked about FP). The majority were *unsure* (65.8%) if FP activities took place in their county/city office. Very few knew the Extension agent a client would want to contact to learn more about FP. Lastly, some MGs were overstepping the scope of their volunteer role by providing the public unsafe and non-recommended resources that could cause clients long-term complications from foodborne illness (Centers for Disease Control and Prevention, 2019).

While all 1,810 active MGs were able to access the online survey, the response rate of 32.4% fell within the expected response-rate range (Baruch & Holtom, 2008). The study verifies beyond anecdotal evidence that people in the community approach MGs for FP advice.

Before the study, the extent to which MGs were asked FP questions during community events was unclear. With MGs encouraging residents to grow and maintain edible gardens through the Grow It Eat It program and the increasing popularity of home FP (Andress et al., 2001), it is logical to assume clients would ask MGs their advice about various FP topics. The majority

(65.5%) of respondents experienced some FP question(s) from the public. However, the University of Maryland Extension Master Gardener Coordinator Manual (2019) states MGs “should not present training or answer questions” (p. 48) on canning, dehydration, and freezing. MGs are not legally covered to teach and advise on FP. These results may lead to an identification of FP topics and resources that MGs could safely share with clientele. Program leaders and administration may decide to modify MG training and education to address FP because MGs are often asked about FP during community events (65.5%).

A survey item asked what resources MGs provided clients. It is currently advised that MGs direct clients to the university’s food preservation webpage or direct clientele to appropriate Extension professionals (University of Maryland Extension, 2019). Ensuring this mode of communication would stay within legal expectations and ensure that an Extension agent trained in FP and legally covered by the university gives FP advice, thus providing science-based information to the client. MGs identified 218 resources that included non-Extension and non-U.S. Department of Agriculture resources; this highlights a protocol gap in MG training and education. Shifting MG behavior to recommend desirable resources from land-grant universities and the U.S. Department of Agriculture would prevent the risk of providing an unsafe FP method that could cause mild to debilitating foodborne illness symptoms and potential death (Centers for Disease Control and Prevention, 2019).

A recent study specifically investigated Facebook food bloggers averaging 145,952 followers (Savoie & Perry, 2019). Researchers found that recipe adherence for safe salsa processing for home FP omitted key safety mechanisms in the directions (Savoie & Perry, 2019). MGs in our study directed clientele to some non-recommended resources, including digital media platforms, such as online blogs and video platforms. The study by Savoie and Perry (2019) shows the potential danger for the public to access unsafe FP recipes on social media platforms where safe processing mechanisms are missing from the directions. Similar concerns were raised in our study from the resources MGs shared. This study may show a shift from family and friends being the traditional source of canning knowledge (D’Sa et al., 2007) to internet resources, where internet-misinformation is known to occur (Wang et al., 2019), creating a new source of information competition for Extension. Results from the study acknowledge that MGs lack materials that they can share during public events that would reduce misinformation on FP and safeguard MGs from advising outside their legal role as MGs.

Lastly, the investigators explored whether MGs knew if FP activities occurred in their county Extension office. Knowing if FP activities were available at their county/city office might help keep MGs within the scope of their horticulture duties and improve the overall branding of the diverse services Extension offices can provide their communities. However, MG’s knowledge of FP activities at the local level was surprising because the majority of MGs were *unsure* if canning workshops occurred at their county Extension office (65.8%). Of the MGs who responded *yes* to knowing canning workshops occurred in their county Extension office (20.7%),

some provided names of retired agents and names of current agents that did not teach FP. Not all Maryland Extension offices have a 4-H or FCS agent trained in FP. Our study demonstrates a potential limitation in FP marketing and communications internally and externally, as well as some MGs exhibiting inattentive blindness by not observing something in plain sight (Mack & Rock, 1998). For example, an FP advertisement in an MG newsletter or Extension office that a MG would see in plain sight but does not notice. The posted but not seen FP flyer or newsletter item may have led some respondents to select *no* or *unsure* in the current study. MGs' unawareness can signal that flyers in a county/city office are unremarkable and need redesigning. Constant communication between agents teaching FP and the MGs is needed to improve this area of branding of services provided to the community.

Recommendations

The research team encourages other state Extensions to administer a similar exploratory survey among their active MG volunteers to identify and address any gaps in communication, resources, programming, and MG training policies on FP. The research team recommends that Maryland Extension administer a similar FP online survey to MGs every few years to monitor progress and new issues. A task force to investigate piloting a Master Food Preserver Volunteer Program to address some of the emerging needs and statewide challenges around FP education and dissemination may be warranted.

Future Implications

The present investigation confirms beyond anecdotal narratives that MGs receive and respond to FP questions during community events, possibly overstepping the legal scope of their volunteer duties. The results have important implications for improving communication and dissemination of FP information to the community. First, program leaders and agents need to reevaluate current community dissemination channels for science-based FP information. Second, exploring how MGs could share science-based FP information and county resources with the community that does not overstep their home garden volunteer role or legal coverage as a volunteer. For example, updating FP print materials and employing social media posts. Third, more communication and visibility of the Extension agent(s) trained on FP, such as attending MG meetings and events to build intra-office rapport. Last, strengthening MG education, training, and policies around FP.

Limitations to the Study

Generalizations from this study may be limited to Extension programs that lack a Master Food Preserver Volunteer Program. The study was unfunded, and time was a limiting resource to allow for extended sampling and incentives to increase MG participation. The nature of an online self-administered survey could make respondents feel obligated to provide socially desirable responses, despite the anonymity of the data collection method (Paulhus, 2017). When MGs self-

identified their frequently asked FP question by the public, the number of responses focusing on tomatoes could be due to the time the survey was disseminated (April and May). Many Extension county/city offices host a plant sale by the MGs in May and start tomato seedlings for the event, so the plant sale and their own grower's bias could have limited the response on other FP topics. Last, a question asking MGs their risk perceptions of FP to foodborne illness would provide more insight to an FP-foodborne illness association because MGs may not perceive FP as being a food safety risk, as Camire et al. (2019) showed among Maine consumers. Thus, emphasizing the need for education and information dissemination (D'Sa et al., 2007).

The present study offers a tool for similar investigations in the future to determine what types of questions MGs are receiving about FP during community events. An online platform to administer the survey was time and cost-effective (O'Neill, 2004; West, 2007), guaranteeing that all MGs had access to participate in the survey, with an acceptable response rate (Baruch & Holtom, 2008). Future studies should increase the amount of time to participate in the study and provide an incentive to increase MG responses. Results from the survey highlighted weaknesses around effective communication between Extension agents and volunteers that will help program leaders and agents adapt and create materials, policies, and programming to fill community gaps concerning food preservation in Maryland and continue to modernize and advance home food preservation in Extension.

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