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An Assessment of Canning Practices among Food Preservation Workshop Participants during COVID-19 in Texas

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Interest in home food preservation has continued through the COVID-19 pandemic. This study assessed home food preservation practices among individuals attending workshops delivered primarily through distance technology. Two hundred eighty (280) participants completed a survey that assessed methods of food preservation and sources of information and recipes that had been utilized within the previous 12 months. Of those participating, 148 had recently canned food, and 90 of those individuals reported using one or more unsafe methods of food preservation, such as processing vegetables with a boiling water bath canner, open kettle, or oven canning. The internet was the most popular source for food preservation information and recipes, followed by family and friends. One out of four participants who had canned within the previous year reported adapting the recipes. Results suggest a continued and strong need for promoting research-based information and recipes to help those interested in home food preservation gain the skills and knowledge necessary to do it safely.

Keywords: Home food preservation, food safety, canning

Introduction

Home canning, freezing, and dehydrating continue to be popular methods of preserving foods at home. This was evident in 2020 when the surge of home gardening due to the COVID-19 pandemic led to shortages of canning jars and other supplies (Stroud, 2020). Niles et al. (2021) reported an estimated 35% and 24% increase in gardening and canning practices, respectively, in a sample of 600 adults residing in Vermont. Another study that assessed the types of resources needed among 383 individuals in North Carolina found that 27% wanted advice on home gardening while 24% were interested in home food preservation techniques (Haynes-Maslow et al., 2020).

People preserve food at home for many reasons, including controlling food ingredients, becoming more self-sufficient, or saving money (Dye & Hoffman, 2014). Regardless of the reason, it is critical that safe preservation methods and research-tested recipes be followed to prevent spoilage and foodborne illness. Nearly 29% of the 326 confirmed cases of botulism between 2001 and 2017 have been linked to foods preserved at home (Luquez et al., 2021). Unfortunately, a search of published literature yields limited research on current home food preservation practices. D'Sa et al. (2007) previously reported that 44% of individuals who

canned fruits and tomatoes did so using the open-kettle method, while 35% used the same technique for preserving vegetables. The open-kettle method is an outdated and unsafe process by which hot food is placed into hot sterilized jars, then lids are attached, and the product is allowed to cool at room temperature. An evaluation of 39 individuals attending a food preservation course in Idaho found that nearly 31% were not using research-tested recipes or acidifying tomato products when canning, 23% were not correctly processing high-acid food, and approximately 31% were not following a research-tested recipe or recommended processing instructions (Dye & Hoffman, 2014).

In Texas, county Extension educators may offer *Preserving the Harvest* workshops to teach current, research-based home food preservation methods. These workshops typically feature a combination of lectures and hands-on activities that allow participants to prepare and preserve a product they can later consume. Topics addressed include pressure canning low-acid foods, boiling water canning high-acid food products such as pickles, salsas and sweet spreads, freezing, and dehydrating.

Since March of 2020, the COVID-19 pandemic has halted nearly all in-person workshops, forcing Extension educators to use distance technology to deliver education programs, including those on food preservation. This study assessed the current food preservation practices of individuals attending those workshops. The knowledge gained offers current insight into consumer practices as well as their preferred sources of food preservation information. Information learned will be used to develop future food preservation programs for Extension educators.

Methods

Survey Development

An assessment of current canning and home food preservation practices was completed using the pre-survey developed for the recommended but optional evaluation of *Preserving the Harvest* workshops in Texas. This pre-survey includes selected questions from the National Center for Home Food Preservation (NCHFP) National Canning and Preserving Survey (D'Sa et al., 2007). Canning, freezing, and dehydrating questions were adapted to reflect the respondent's previous 12-month period. The NCHFP survey was originally administered by telephone but was modified so it could be self-administered using pen and paper and subsequently entered into Qualtrics (Provo, UT, USA). Demographic questions were added and included county of residence, gender, race/ethnicity, and year of birth so participant age could be calculated. Participants were asked to identify themselves only through the last four digits of their phone number so the pre-survey could later be paired with the post-survey used for workshop evaluation.

Participant Recruitment

Individuals who attended educator-led and specialist-supported food preservation workshops between March 2020 and August 2021 were invited to complete the survey prior to the beginning of any instruction. Workshops were advertised using social media, newspapers, county Extension websites, and newsletters. Because most workshops were planned for virtual delivery, a direct link to the survey was emailed to each registered participant prior to the event. For workshops held in-person, the participant completed the survey prior to instruction, which was later entered online (Qualtrics®) by the educator.

Workshop Format

Workshops featured one or more food preservation methods (e.g., sweet spreads, salsa-making, pressure canning, freezing, or dehydration) and were offered as either a single education session or a series of sessions, depending on educator schedules and perceived clientele needs.

Workshops held virtually included a didactic segment and usually featured a short video to demonstrate the steps in the food preservation method featured. Educators were encouraged to utilize the pre-survey regardless of the length of the workshop series.

Data Analysis

Data analysis consisted primarily of descriptive statistics calculated using IBM SPSS Statistics version 27 (IBM Corp., Armonk, NY, USA). Because the survey was used for program evaluation and involved the secondary analysis of de-identified data, the Texas A&M Institutional Review Board determined this was not human research. For this paper, only the pre-survey data are presented.

Results

According to the Texas AgriLife Extension Service reporting system, educators from 14 counties led 31 *Preserving the Harvest* workshops during the study period. Twenty-eight of those workshops were conducted virtually. Workshops ranged from one to eight sessions, generated an estimated 2,216 educational contacts, and reached approximately 564 individuals. Of those reached, 280 individuals residing in 78 counties across the state completed the survey.

A majority of the participants were female (86%; $n = 240$) and identified as either White (55%; $n = 154$) or Hispanic (33%; $n = 93$). The average age was 51 (SD 13 years; range 23 to 82). Almost all ($n = 269$, 96%) participants completed the food preservation workshops virtually, although 11 (4%) attended in person.

Of the 280 respondents, 241 (86%) reported using at least one method of home food preservation within the previous 12 months. Among all participants, freezing was reported by 80% ($n = 224$), followed by canning jams, jellies, and pickles (45%; $n = 125$). Nearly 38% ($n = 105$) had

processed fruits, tomatoes, or dried foods. More than 40% of all participants had not pressure canned within the previous 12 months, and a large percentage had no experience processing meat, poultry, seafood (55%), or vegetables (49%).

Canning Practices of Participants

Of the 280 respondents, 148 (53%) reported preserving food by canning within the previous 12 months. A boiling water bath canner (BWBC) for processing jams, jellies, and pickles was most often reported, followed by fruits and tomatoes (Table 1). Pressure canning was used least often, and approximately half of the participants had no experience with this preservation method.

Twelve methods of canning considered unsafe by the United States Department of Agriculture, National Institute of Food and Agriculture (USDA, 2015) are identified in Table 1. Using a pressure cooker is not considered safe for preserving low-acid foods such as vegetables and meats. Pressure cookers tend to be smaller than pressure canners; as a result, they reach the processing pressure and cool down to zero pounds of pressure faster than a pressure canner. The time it takes to reach the desired pressure and depressurize down to zero is part of the total processing time needed to process low-acid foods safely. If this time is shortened, which would be the case in a pressure cooker, there is a risk of under-processing the food, increasing the risk of foodborne illness (National Center for Home Food Preservation, 2015). If the pressure cooker is large enough to cover the tops of the jars with at least one inch of water and is used as a BWBC for processing high-acid foods, then this is considered a safe option for processing high-acid foods. Of the 148 who had previously canned, 90 had used one or more unsafe methods. Nearly 1 in 3 (32%) participants who had previously canned reported using a BWBC to process vegetables (not pickles or acidified tomato products); 3% had used the BWBC for preserving meat, poultry, or seafood. Use of the open kettle method was reported more frequently for fruits, tomatoes, jellied products, and pickles (nearly 1 in 4 participants who canned) than for vegetables and meats. The use of the oven and pressure cooker for processing foods also was reported. Both of these methods are considered dangerous and can result in foods that are under-processed and unsafe to eat.

Table 1. Self-Reported Practices Used by Individuals Who Have Canned Foods at Home Within the Previous 12 Months*

Practice	Used within previous 12 months N (%) *	Not used within previous 12 months N (%)	Have never done N (%)
SAFE METHODS			
Boiling water bath canner to process			
Fruits and tomatoes	95 (64)	32 (22)	20 (13.5)
Jams, jellies, and pickles	116 (78)	19 (13)	13 (9)
Pressure canner to process			
Fruits and tomatoes	15 (10)	62 (42)	68 (46)
Jams, jellies, and pickles	10 (7)	63 (43)	75 (51)
Vegetables	13 (9)	62 (42)	73 (49)
Meat, poultry, or seafood	7 (5)	59 (40)	81 (55)
Pressure cooker to process**			
Fruits and tomatoes	10 (7)	63 (43)	75 (51)
Jams, jellies, and pickles	9 (6)	65 (44)	73 (49)
UNSAFE METHODS			
Boiling water bath canner to process			
Vegetables	48 (32)	59 (40)	39 (26)
Meat, poultry, or seafood	5 (3)	66 (45)	76 (51)
Open kettle method for			
Fruits and tomatoes	34 (23)	56 (38)	57 (39)
Jams, jellies, and pickles	36 (24)	55 (37)	56 (38)
Vegetables	15 (10)	63 (43)	70 (47)
Meat, poultry, or seafood	5 (3)	60 (41)	82 (55)
Pressure cooker to process			
Vegetables	6 (4)	65 (44)	77 (52)
Meat, poultry, or seafood	4 (3)	56 (38)	87 (59)
Oven to process			
Fruits and tomatoes	9 (6)	62 (42)	77 (52)
James, jellies, and pickles	10 (7)	62 (42)	75 (51)
Vegetables	4 (3)	62 (42)	82 (55)
Meat, poultry, or seafood	14 (10)	52 (35)	81 (55)

* Based on the 148 individuals who had canned within the previous 12 months of completing the survey. Percentage is rounded to the nearest whole number and reflects only those responding to that specific practice. Missing responses are not included. **Method is considered safe, assuming the cooker is used as a BWBC, is large enough for at least one inch of water to cover the tops of jars, and is only used to process high-acid foods.

Using a Tested Pressure Canner

Of all participants, 53 reported owning a pressure canner. Of those, 26 identified their canner as a dial gauge; the rest were weighted gauge canners. Of the 26 with a dial gauge canner, 20 (77%) had not been checked for accuracy within the past year. However, more than half of those with an unchecked dial gauge had also not engaged in pressure canning within the previous year. Among the 148 who had canned in the previous 12 months, 36 owned a pressure canner, for which 20 of them were a dial gauge. Among those 20, only four of those dial gauges had been checked within the previous 12 months.

Sources of Canning Recipes and Canning Instructions

Of the individuals who reported canning in the previous 12 months, all identified at least one source for obtaining information about home food preservation (average was 2.4 ± 1.3 SD). The most popular sources reported were the internet (58%), family and friends (41%), the *Ball Blue Book* (35%), USDA publications (30%), Extension publications (28%), manufacturers of canning supplies (24%), and general cookbooks (22%). Most participants ($n = 109$; 74%) who had canned reported following the instructions as they were written; however, 37 (25%) of the participants had adapted the recipes.

Discussion

Our results provide timely insight into the food preservation practices currently being used by individuals in Texas. Based on the estimated participation in the workshops, our findings also support previous research suggesting that unsafe food preservation practices continue to be used. While some participants in our study followed recommended practices, nearly 61% had utilized one or more unsafe methods, including the open kettle method, oven canning, and a BWBC for low-acid foods. Using these unsafe methods is dangerous and reinforces the need to promote research-based techniques and recipes to those interested in learning about home food preservation.

A pressure canner can expand the types of foods that can be preserved at home. For those who use a dial gauge pressure canner, it is recommended that the gauge be tested annually to assure accuracy. Regardless of their canning experience, the majority (77%) of participants with a dial gauge canner had not had their gauge checked within the previous year. By comparison, 88% of those studied by D'Sa et al. (2007) had not had their gauge tested. In our study, it is possible that some dial gauge canners had been recently purchased. Additionally, the pandemic most likely limited our Extension educators' ability to test gauges due to social distancing policies that were in effect at the time. Still, it is important for individuals who plan to preserve low-acid foods at home with a dial gauge canner to annually check them for accuracy to ensure that processing is done safely.

Participants in our study identified the internet most often for food preservation information. Camire et al. (2019) surveyed 483 individuals in Maine and found that recipe websites (27%), cookbooks (26%), and YouTube (10%) were most often referenced as sources of information related to fermenting foods. There is no lack of information about food preservation on the internet. However, because there are no gatekeepers as to what can be posted, care must be used when searching the web for information and recipes. Savoie and Perry (2019) analyzed 56 blog posts about tomato-based salsa recipes and compared them to USDA home canning guidelines and recommendations from the National Center for Home Food Presentation. They concluded that only 14% provided instructions for proper acidification, an important step in preparing salsa. Most of the blogs and recipes did not properly describe the processing step. Family and friends were the second most popular source of information identified by our participants, which was lower than the 51% previously reported by D'Sa et al. (2007). Unfortunately, the food preservation knowledge of our participants' families and friends is unknown. Extension professionals must be proactive in promoting credible sources of information to consumers and caution against unsafe practices. A number of state Extension agencies have developed videos available on the web and shared through social media platforms. Others have developed online courses as well as fact sheets that can be accessed. Finally, many states, including Texas, utilize the National Center for Home Food Preservation website (<http://nchfp.uga.edu>) for up-to-date information and research-based recipes.

In our study, an estimated one in four participants who had canned in the previous 12 months reported adapting the recipes, less than the 30.5% previously reported by D'Sa et al. (2007) but still concerning. Most research-tested recipes will state what, if any, adaptations can be made to a recipe without compromising safety or quality. Adaptations might include eliminating salt when pressure-canning vegetables or using a different type of pepper for preparing salsa as long as the total amount remains the same. While we do not know the types of adaptations made, it is important that Extension educators stress to clientele the importance of using research-tested recipes from reliable sources such as the National Center for Home Food Preservation and only making adaptations that are clearly noted to prevent spoilage and/or foodborne illness.

Limitations

This study has several limitations that should be acknowledged. First, since most of the workshops were held virtually, it is possible that the estimated number of individuals reached was underreported since the link to the survey was only sent to those who registered for the workshop. Because counties had the autonomy of deciding how many sessions to offer, there might have been some bias in how participants answered the survey questions. We also did not assess every aspect of home canning, such as checking for elevations or examining the seals on jars. Although our survey provides current insight into what preservation methods are being used, a more robust survey with a larger sample size would be beneficial to confirm and expand our knowledge on home food preservation practices for future educational program development.

Finally, our sample size is smaller than in previous studies. The small sample size is most likely due to the nature in which most workshops were held (virtually) but also because the use of the survey by Extension educators in Texas is optional. Therefore, caution must be used in generalizing our results. As educators move back towards in-person programming, encouraging the use of this survey instrument for all *Preserving the Harvest* workshops can help monitor food preservation behaviors and practices for future programming efforts.

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