
Final Report

**Focus Groups on Barriers that Limit Consumers'
Use of Thermometers
when Cooking Meat and Poultry Products
Phase One**

Contract No. 43-3A94-7-1637

Submitted to:

**United States Department of Agriculture
Food Safety and Inspection Service
2159 South Building
Washington, DC 20250**

Prepared by:

**Patrick T. Koepl
Macro International Inc.
11785 Beltsville Drive
Calverton, MD 20705**

January, 1998

Focus Groups on Barriers that Limit Consumers' Use of Thermometers when Cooking Meat and Poultry Products

Baltimore, Maryland
November 3 and 4, 1997

and

Richmond, Virginia
November 11 and 12, 1997

I. Executive Summary

The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) is recommending that consumers use a meat thermometer when cooking all raw meat and poultry products to insure that the cooking process destroys whatever harmful bacteria may be present in the products. Failing to cook meat and poultry thoroughly can lead to serious foodborne illness and even death. In order to develop an effective consumer education campaign aimed at increasing thermometer usage, the Food Safety and Consumer Education Staff of USDA needs to identify what limits consumers' use of food thermometers.

USDA hired Macro International Inc. (Macro) of Calverton, MD, to conduct a total of six focus groups, three each in Baltimore, MD, and Richmond, VA. In each community groups representing the three most at-risk populations (children, young adults, and senior citizens) were held. Four main areas were explored, including: barriers to thermometer use; managing the cooking process; choosing a thermometer; and behavior modifications. Additionally, USDA wanted to gain an understanding of the level of food safety knowledge in each of the targeted populations and gain an overall understanding of the acceptance of such a food safety message.

A. Findings

1) Food Safety Knowledge

At the beginning of each group a series of general food safety questions was presented to the participants. Consumer food safety knowledge in all groups was quite good. Participants knew that certain bacteria and organisms caused foodborne illnesses, however their knowledge of detailed causes was limited and inaccurate at

times. In all groups participants agreed that there are many ways to check whether or not your food is properly cooked. Every groups stressed the importance of cutting into meat and poultry to visually check doneness.

To the question, “How Do You Know That Your Food Is Safe?” various responses that imparted information about the general food safety knowledge and practices of the focus group participants were offered. Comments were divided roughly into the following subjects: **washing and cleanliness; refrigeration; packaging; food labeling; proper cooking; sensory precautions; and other.**

With the exception of exact details regarding the origins of salmonella and E. coli, most participants were aware that while such sources of concern are present in many food items, proper care and handling can prevent foodborne illnesses from these sources. Most participants agreed that cooking meat and poultry kills the microorganisms that are contained with it. When asked, nearly all of the participants in all groups stated that they were familiar with food safety labeling. Probes were directed at participants to elicit both what the labels typically say and where the labels can be expected to be found on a food package. Respondents primarily commented on their familiarity with food safety labels for meat and poultry products, but some also mentioned nutritional information, expiration dates, and refrigeration warnings.

To the question, “How Do You Know Your Food Is Cooked?” participants in all of the groups had many interesting, if not technically proper, answers. Several participants stated that the only way to be sure the meat or poultry was safe to eat was to use a meat thermometer to check the internal temperature. To the question, “How Do You Learn Different Techniques?” the following were among the responses given: “Practice,” trial and error and through experience, cook books, recipes from family, “You learn by doing,” “From my mother,” and “Gut feelings.”

2) Barriers to Thermometer Use

After determining the level of food safety knowledge for each group, the moderator turned the discussion to the use of thermometers. Questions pertaining to any perceived barriers to the use of thermometers were directed to the groups in the following order: When do you use a thermometer?; What would keep you from using a thermometer?; What would convince you that a thermometer should be used?; Are there safe alternatives to using a thermometer?; and, Does using a thermometer guarantee safety? These questions and appropriate probes were asked in all groups.

Nearly everyone agreed that thermometers were most often used for large items such as turkeys and roasts, or for items that the preparer had little experience with cooking. Many participants offered that they used thermometers because while they were growing up that is how they saw their mothers prepare a similar dish. Most participants agreed that the thermometer is used to check doneness, but not to ensure safety. Participants offered a myriad of reasons for not using thermometers. Inconvenience, laziness, and “hassle” were all offered as barriers to thermometer use. “Experience,” leading to the feeling that a thermometer is not needed or just an added step, was also frequently mentioned. Most participants agreed that media messages reporting serious illness might convince them that thermometer use is necessary. Others suggested that if cooking instructions specifically stated to prepare food to a certain temperature rather than for a certain duration, thermometer use would increase. Most participants felt that there are several safe alternatives to the use of a thermometer, and also felt that using a thermometer is no guarantee of safety in any event.

3) Managing the Cooking Process

Questions around the actual use of a thermometer for cooking centered on managing the cooking process. Respondents were asked to explain how they have used meat thermometers in the past and to describe their experience with the tool. The process of using the thermometer, start to finish, was elicited from participants as was knowledge regarding different safe temperatures for various meat and poultry, and whether or not differences led to confusion during the cooking process. They were asked to describe where they acquired their knowledge on the subject. Respondents were also asked if they would consider using a thermometer with some food products but not with others, and to explain any rationale for this decision. Respondents were then asked to respond to a hypothetical situation in which they were to use a thermometer to test the doneness of 20 or more hamburgers on a grill.

4) Choosing a Thermometer

In general, consumer knowledge of thermometer types, features and options was limited. Many participants, especially in the senior citizen groups, were aware that there are two typical kitchen thermometers: meat and candy. Very few of the participants in the young adult and young parent groups in both cities had experience using thermometers in cooking meat or poultry, with the exception of using a thermometer when preparing a Thanksgiving meal. Most participants in all groups

thought that thermometers are easy to use. They expressed concerns, however, as to whether or not using a thermometer would guarantee their food preparation was adequate.

Most participants agreed that thermometers come ready to use when purchased, that they read temperatures accurately. Cost estimates for various thermometers ranged from \$1 to \$100, with most participants agreeing a good, reliable thermometer could be purchased for between \$5 and \$10. Participants in all groups overwhelmingly favored the standard meat thermometer with the large dial and the temperature information printed on the thermometer face. Participants cited many negative features about models other than the standard “old fashion” meat thermometer.

5) Behavior Modifications

Participants were asked to discuss several questions and issues related to food safety messages and how such messages could best be conveyed. Specifically, they were asked to discuss whether or not they felt they could safely prepare foods to their personal tastes without compromising safety, what impact major national foodborne illness reports have on their personal consumption practices, and what information would encourage consumers to use thermometers. In all groups in both cities respondents were less than enthusiastic about using thermometers while cooking. Many felt that they have been cooking without a thermometer for years without suffering any adverse results. One participant said that after participating in the group, she would be more likely to use thermometers in the future. Several participants added that they would go home and locate their thermometers, taking them out of “the drawer” and attempt to use them in the future.

B. Discussion

The six focus groups revealed interesting information related to consumers perceptions of thermometer use and the barriers to their use. With the exception of the senior citizen groups, participants seemed far less likely to use thermometers that is suggested by past research. Seniors did report more experience and familiarity with thermometer use than did the young adult and young parent groups. Gender seemed to have only a small role in thermometer use and potential barriers to their use as well. Geography had little bearing on thermometer use, although it seemed to be important in terms of food safety knowledge. Along with demographic distinctions, several interesting themes and issues emerged from the groups. While participants seemed aware of many important food safety practices,

misinformation and misconceptions regarding thermometer use and general food safety was found.

1) Distinctions of Note

During analysis of the transcripts for each group, several interesting dichotomies of thought emerged. Participants in all groups discussed their perceptions of barriers to thermometer use and overall understanding of food safety, and in the process articulated their thoughts and attitudes regarding cooking and food safety in general. Frequently individuals will not fully realize why they do or do not engage in certain behaviors and activities. The classifications and distinctions they discuss offer insight into those areas of concern that are capable of being acted upon. As such, recognizing and attempting to understand dichotomies in these discussions is of the utmost importance. Over the course of these six groups, eight important dichotomies emerged. They include: ease versus hassle; thick versus thin; stove versus oven; doneness versus safety; moist versus dry; cooking for self versus cooking for others; special event versus regular cooking; and folk knowledge versus scientific knowledge.

2) Recommendations

Behavior Change is Possible

Participants in both the young adult and the senior citizen groups in both cities stated that they would be very unlikely to change any behaviors regarding how they prepare the meat and poultry that they serve. Parents of young children indicated that they could be persuaded to change their behaviors if they felt that such changes would ensure the safety of their children. They indicated, however, that they would be unlikely to change behaviors solely for their own benefit. While the clear message from participants was that they are unlikely to modify their behaviors to include the use of thermometers, experience has shown that individuals may be more likely to change than they explicitly state.

Target Parents of Young Children

Of the three demographic groups considered, the parents of young children seemed most receptive to changing behaviors in the kitchen. Many of them expressed how they altered their behaviors in the past once their child had been born. Wiping down counter tops and preparing separate meals were mentioned as two modifications to previous behaviors that occurred following the birth of a child. Participants believed that parents are the main source of food preparation and safety knowledge in the home, and the source of most peoples' information and enculturation on the subject of food safety and food handling. Parental use of thermometers in the home would model this behavior to their children, thus impacting the next generation's use of the tool.

Highlight Ordinary Meals, Not Special Events

Participants indicated that thermometers are most often used during the preparation of meals at holidays or other special times. Reinforcement of the behavior during these times is not necessary. Emphasizing the use of thermometers for daily preparation of meat and poultry introduces behavior change, and would be most effective at producing this change.

Emphasize Taste, Not Safety

Participants in all groups agreed that they felt safe about the food they served in their own kitchens without using thermometers. Many participants stated that they would be more likely to use a thermometer if they were convinced that it would enhance the flavor and quality of the meal that they prepared. This belief would be more persuasive than if the message was one of safety alone.

II. Introduction and Objectives

The Food Safety and Inspection Service (FSIS) of the United States Department of Agriculture (USDA) is recommending that consumers use a meat thermometer when cooking all raw meat and poultry products to insure that the cooking process destroys whatever harmful bacteria may be present in the products. Failing to cook meat and poultry thoroughly can lead to serious foodborne illness and even death.

The most current data on thermometer usage indicates little consumer use. A January 1997 Trends survey conducted by the Food Marketing Institute asked 1,011 consumers what they are doing differently as a result of reading the safe food handling labels on meat and poultry products. Thirteen percent of respondents answered “cooking properly/correct cooking temperatures/follow proper cooking directions.” A 1994 survey by the Meat and Poultry Hotline found there was an almost even split between the percentage of those who use thermometers (49%) and those who do not use thermometers (51%). However, this was not a representative sample of the U.S. population. Only 40% of respondents who use thermometers reported “usually” or “always” using a food thermometer. And only one-fifth of the thermometer users stated that they use their thermometer for all meats.

In order to develop an effective consumer education campaign aimed at increasing thermometer usage, the Food Safety and Consumer Education Staff of USDA needs to identify what limits consumers' use of food thermometers. This report details the first phase of a two phase study to explore the use of food thermometers when cooking all kinds of meat and poultry. Phase One is designed to determine the barriers to the use of thermometers, and make suggestions as to strategies that can be incorporated into an effective consumer education campaign. If exercised, Phase Two will explore consumer attitudes and beliefs regarding the effectiveness of any campaign developed.

Four main areas were explored in relation to this topic. They include:

- Barriers to thermometer use
- Managing the cooking process
- Choosing a thermometer
- Behavior modifications

Additionally, USDA wants to gain an understanding of the level of food safety knowledge in each of the targeted populations and gain an overall understanding of the acceptance of such a food safety message.

III. **Methodology**

A. **Number, Location, and Segmentation of Groups**

USDA hired Macro International Inc. (Macro) of Calverton, MD, to conduct focus group research under GSA Contract No. GS-22F-0092B. A total of six focus groups were held, three each in Baltimore, MD, and Richmond, VA. The Baltimore groups were held on November 3 and 4, 1997. The Richmond groups were held on November 11 and 12, 1997. In each community, each of the three groups (representing the three most at-risk populations: children, young adults, and senior citizens) was composed as follows:

- Group 1: Parents under the age of 45 who have at least one child who is 10 or younger;
- Group 2: Adults 18 to 30 who are single and have no children; and
- Group 3: Senior citizens (defined as age 65 or older).

Other specifications for participation among all groups included the following:

- Participants should be responsible for preparing food in their homes;
- Groups should have ethnic diversity representative of the regional population;
- “Omnivores” only, no vegetarians;
- Participants shall not be employed in restaurants, the food preparation or safety industry (i.e., butcher or meat packer, meat inspector, etc.), advertising or market research, or the Federal government.

B. **Recruitment**

Macro used the services of House Market Research (HMR) of Baltimore, MD, and Southeastern Institute of Research, Inc. (SIR) in Richmond, VA, for both the focus group facilities and to recruit participants in each community. Both HMR and SIR maintain large databases of randomly selected local residents who have indicated a willingness to participate

in market research projects. Potential participants are categorized according to demographic characteristics in these databases. Pre-screening processes help to ensure recruited participants actually attend the sessions. A total of 12 individuals were recruited for each group in Baltimore, and 14 for each group in Richmond. This ensured a minimum of 10 participants for each two-hour group. Of all the individuals who reported to the focus group facilities, ten were selected for each group. Their selection was based on achieving the best cross-sections of cultural and socioeconomic backgrounds, as well as balanced gender representation. All recruit participants received an \$40 incentive for their time, whether or not they were selected to participate in the group.

C. Limitations and Strengths of Qualitative Research

In market research, the focus group approach seeks to develop insight and direction rather than quantitatively precise or absolute measures. Because of the limited number of individuals participating in each group, and the restrictions imposed during recruiting, this research must be considered in a qualitative frame of reference.

Findings should be considered valid from the respondent's point of view, although not generalizable to a given population. A focus group is not a statistically significant representation of a population. Rather, it is a group of individuals selected from the population being studied, and thus can be used to raise issues of concern to that population. In the strict sense, the study cannot be considered statistically reliable since sampling cannot technically be replicated, identical questions cannot be asked in each group, nor can the results of one group compare precisely with other groups; they can only be added to the body of knowledge on the investigated topic.

In reviewing this report, the reader is cautioned against misinterpreting responses in quantitative terms. For example, a statement that "six of eight" participants shared an opinion should not be interpreted as "75 percent of the population agrees." Again, this is because qualitative data cannot be aggregated or quantified to describe a population as a whole.

The strength of qualitative research is that it can identify issues of concern to specific populations, and it can be used to form questions that can be developed further to derive quantitative data about that topic. Focus group research is intended to provide a first step in determining knowledge, awareness, attitudes, and opinions about services, concepts, or products. As the results of this study will indicate, focus groups often identify issues that researchers may not have considered previously, or they may suggest framing questions differently.

IV. Findings

A. General Food Safety Items

At the beginning of each group, a series of general food safety questions was presented to the participants.¹ Consumer food safety knowledge in all groups was quite good. Most participants understood the basics of sanitation and kitchen cleanliness and the importance of being especially careful with raw meat and poultry products. Although it was only explicitly stated in one group, the idea that “common sense” is important was stressed among all participants. Ideas of general cleaning and washing of food stuffs and kitchen facilities and tools were frequently mentioned, as was the need to refrigerate food properly. Participants knew that certain bacteria and organisms caused foodborne illnesses, although their knowledge of these causes was limited and inaccurate at times. Most participants were familiar with safe food handling labeling, and several had comments as to strengths and weaknesses of the current labeling system.

In all groups participants agreed that there are many ways to check whether or not your food is properly cooked. Each group stressed the importance of cutting into meat and poultry to visually check doneness. Most participants agreed that they had learned this procedure by watching others (primarily mothers and grandmothers) prepare food. In all of the groups there were several interesting practices and beliefs discussed. Many of these demonstrated food safety and safe food handling information learned from observation and family tradition. The questions specifically asked of groups are listed below, and a summary of the participant comments is provided.

1) How Do You Know That Your Food Is Safe?

Various responses were offered to this question, all of which impart information about the general food safety knowledge and practices of the focus group participants. Comments are divided roughly into the following subjects: washing and cleanliness, refrigeration, packaging, food labeling, proper cooking, sensory precautions, and other.²

¹ See Appendix A for the moderator's guide.

² Reference codes are included in parenthesis to denote where each response originated. Letters refer to the city where the groups were conducted (B=Baltimore; R=Richmond) and the numbers refer to the demographic set (1=young parents, 2=young single adults, and 3=senior citizens). Thus, B1 refers to parents from Baltimore.

Washing and Cleanliness — Respondents in both cities stressed the importance of washing meat and poultry as one step in preparing it for consumption. The importance of washing anything in the kitchen that comes into contact with raw meat and poultry was also stressed. Many respondents stated that they use two different cutting boards, one for meat and poultry, and the other for vegetables. The importance of cleaning knives and other utensils between uses was also mentioned in several groups. All groups discussed the importance of washing hands often, and many discussed the benefits of antimicrobial soaps. The following bullets detail some of the responses mentioned explicitly during each group:

- Wash meat and poultry (R1, R2, B1, B2)
- Wash your hands (R1, R3, B3)
- Wash whatever is handled (R1, R2, B1, B2)
- Clean all surfaces (R1, R2, R3, B2,B3)
- Clean your cutting board (R1)
- Use different cutting boards for different foods (R1, R2,R3, B1, B2, B3)
- Use an antibacterial or antimicrobial soap (B1, B2,B3, R3)
- Use a weak bleach solution (B2,B3, R3)
- Use extra care with dishrags (B3)
- Switch or clean knives or other utensils after using them with meat (B3, B2)
- Sterilize your pots and pans (R2)
- Use a dishwasher whenever possible (B3, R3)

Refrigeration — The proper refrigeration of meat and poultry was mentioned as one way to protect against foodborne illness. Refrigerating at the proper temperature, placement of food items in the refrigerator, and the process of thawing frozen meat and poultry in the refrigerator were all common responses. (R1, R2, R3, B1, B3)

Packaging — Being careful about the meat and poultry you buy, especially by carefully examining the packing before leaving the grocery store, was mentioned in several sites. “Packaging is important to me. I always go toward the poultry that’s been pre-packaged, like at a plant somewhere. Purdue products, Tysons” (B1). Several participants also mentioned the importance of repackaging meat and poultry prior to storing it in a home freezer. (B2)

Food Labeling — Paying attention to food handling and care labels was often mentioned as one way to protect against foodborne illnesses. Checking freshness dates (B3) and following directions for proper preparation (R2) were mentioned in regard to this question.

Proper Cooking — Proper food preparation was mentioned in all groups as an important way to ensure the safety of food being served and eaten. Comments included: Cook meat and poultry “enough”: (B1, B2, B3, R2); “You really need to cook pork thoroughly” (R2, B1); and cook meat and poultry at the proper temperature. “Definitely cook (meat) to a specific temperature. Each type of meat, poultry, whatever has a temperature that they recommend.” (B1)

Sensory Precautions — Participants in each group discussed trusting one’s senses regarding the safety of the food they eat. In general, all participants agreed that they could tell if something either looked or smelled spoiled or unsafe. Smelling and checking visually were the two most common responses. (R2, R3, B1, B2, B3)

Other — Many comments were made that food safety starts with the point of purchase, and continues until the food is eaten. Participants felt that buying food from a “reputable store” offered some assurances that the food would be safe for consumption. “Buy it (meat) from a reputable store. Some stores I wouldn’t buy some things from.... [Store X], their meat is scruffy. Let’s say you go to your grocery store. Go in to use the bathroom. How it looks, just in general. Is everything well stocked? Is it stocked neatly? And how is it organized? How it smells, too” (R1). Trusting the butcher at your local store was also considered important:

The people who work back there are like butchers. . . or butcher apprentices. So when you go there, they’re not stupid. They sound intelligent, they know what they’re doing. You ask them and they know. So somebody is not going to give you tainted meat as easily as somebody who’s like ‘Oh yeah, yesterday I was the shelf-stocking boy, and now I’m learning to cut meat’ (B2).

One Baltimore respondent suggested that buying Kosher products gave her an added sense of security. Other participants felt reassured that government inspections catch most of the major problems before the products reach store shelves. (B3)

One Richmond participant stated that he always scrapes fatty tissue off his steaks before he prepares them. “When making a steak, I’ll take a butter knife and scrape both sides of the steak. Because I don’t want to eat the stuff that comes off. I don’t know what they call it.” (R2)

2) What in Food Can Hurt You?

Participants in all groups had fairly accurate common knowledge regarding some of the causes of foodborne illnesses. With the exception of exact details regarding the origins of salmonella and E. coli, most participants were aware that while such sources of concern are present in many food items, proper care and handling can prevent foodborne illnesses from these sources. Most participants agreed that cooking meat and poultry kills the microorganisms that are contained with it. The following is a list of all the answers provide to this question.

- Bacteria (R3, R1, B1, B2)
- Organisms (R1)
- Salmonella (R2, R1, R3, B1, B2)
- E. coli (R2, R1, R3, B1, B2)
- Pesticides (R2)
- Botulism (R3)
- Trichinosis (R3)
- Hepatitis (R3)

One young adult in Baltimore made the following statement: “Any meat is such a deadly thing if it’s not cooked right. Like that E. coli stuff that kills those people, is like the nastiest bacteria on Earth. All meat is bad if you don’t cook it right.” (B2)

3) Food Safety Labels

When asked, nearly all of the participants in all groups stated that they were familiar with food safety labeling. A few participants in the Richmond young adult group indicated that they had never seen food safety labeling before. Probes were directed at participants to elicit both what information is typically found on food labels and where the labels can be found on a food package. Respondents primarily commented on their familiarity with food safety labels for meat and poultry products, but there was some mention of nutritional information, expiration dates, and refrigeration warnings. According to group participants, food safety labels include the following components:

- The correct temperature at which to store meat and poultry (B2)
- Picture of a thermometer to indicate cooking temperature (B1)
- Recommendations for washing hands in hot, soapy water after handling raw meat and poultry (R2, R1, R3, B1)
- Directions on how to thaw frozen meat products (B1, B2, R3)
- Expiration dates (R2, R3, B1, B2)
- Directions to refrigerate after opening (R2, B1, B2, B3)
- The temperature at which to cook the meat or poultry (B2)
- Directions to remove the original wrapping, and rewrap prior to freezing (B3)

In general, participants who were familiar with food safety labels thought that these labels are helpful when they take the time to read them. However, there were several criticisms of the labels. Participants suggested that the printing on the labels is too small to be easily read. (B1, R1, B2) Interestingly, no participant from either senior citizen group voiced this concern. Several individuals stated that they have not paid much attention to the labels. “It’s not a conscious decision not to pay attention to them, I just haven’t. I know they’re there, but I don’t really pay attention to them.” (R1) Another respondent stated, “You feel like if you’ve read it one time, how many times do you need to read the same label? So you tend to stop doing it. And I guess that is not good, because they could have some new information out there.” (R1)

Participants in several groups thought that the bottom of meat and poultry packages is the wrong place for food safety labels. “I just usually rip open (the packaging) at the sink, and don’t bother looking at the bottom of the package. I take it out of the freezer and slit open the package, just pick out the chicken. So, I don’t usually look at the bottom.” (B2) Another respondent simply added, “They’re in the wrong place. They’re on the bottom of the package.” (B2)

Another participant stated that food safety labels are merely disclaimers to protect food producers from being sued. He stated:

I view a lot of the labeling as disclaimers. I would, and I know people do, sue over anything. And when you buy a lawnmower these days there are so many labels on it that say ‘Don’t put your hands on blade.’ It seems like some people probably tried to eat raw chicken and got sick. It was, ‘Well, it didn’t say you had to cook it before you ate it.’ So now they have new labels that say cook before eating. (B1)

4) How Do You Know Your Food Is Cooked?

Participants in all of the groups had many interesting, if not technically proper, ways of determining when the meat or poultry they cooked was ready to be eaten. Some participants stated that the only way to be sure the meat or poultry was safe to eat was to use a meat thermometer to check the internal temperature. (R2, R1, R3, B3) This, however, was the exception, and not the rule. The following bullets summarize the variety of ways individuals employed to ensure that their food was ready for consumption:

- Using the eye-ball method (B3)
- Just trying a taste of the meat or poultry (B2)
- Cutting into the meat or poultry for a visual check (R1, R3, B2)
- Pulling at the chicken leg (R3)
- Relying on a pop-up timer (B1, B2, R1, R2)
- Cooking the meat or poultry until it is not red or pink inside (B1, B2)

- Sticking the meat or poultry with a fork (R3, R2, B1)
- Seeing if the juice or fluids run clear (R3, R2, B1)
- “When it’s cooked all the way, it’s done” (R2)
- “By feel” (B1)
- “By experience and intuition” (B1, B2)
- “When it reaches the proper temperature” (B2)

Several young adult participants in the Baltimore group related that they would rather risk getting a foodborne illness than prepare their meat or poultry in any other fashion than to their liking. The following three comments reflect this thinking:

- “A good steak should be bleeding a little bit” (B2)
- “(It’s ready when you) pass it through a warm room” (B2)
- “When it looks done” (B2)

5) How Do You Learn Different Techniques?

When asked how the methods and techniques mentioned above were learned, the following responses were provided:

- “Practice” (R1)
- Trial and error and through experience (B2, B3)
- “Doing it over and over again” (R2, R1)
- “It tastes right” (R1)
- Cook books (R1, R3, B1, B2)
- Word of mouth (R3, B3)

- Recipes from family (B2)
- Pictures (B2)
- “You learn by doing” (R2, R3)
- Newspaper and media (R2, B3)
- Learn in school, home economics class (R2, R3, B1)
- “From my mother” (R3, B1, B2, B3)
- Pamphlets (B1)
- “Talking to other women” (B3)
- “Gut feelings” (R2)

B. Barriers to Thermometer Use

After determining the level of food safety knowledge for each group, the moderator turned the discussion to the use of thermometers. Questions pertaining to any perceived barriers to the use of thermometers were directed to the groups in the following order: When do you use a thermometer?; What would keep you from using a thermometer?; What would convince you that a thermometer should be used?; Are there safe alternatives to using a thermometer?; and, Does using a thermometer guarantee safety? These questions and appropriate probes were asked in all groups.

Nearly everyone agreed that thermometers were most often used for large items such as turkeys and roasts, or for items that the preparer had little experience with cooking. Many participants offered that they used thermometers because while they were growing up that is how they saw their mothers prepare a similar dish. Most participants agreed that the thermometer is used to check doneness, but not to ensure safety. Participants offered a myriad of reasons for not using thermometers. Inconvenience, laziness, and “hassle” were all offered as barriers to thermometer use. Experience leading to the feeling that a thermometer is not needed or just an added step was also frequently mentioned. Most participants agreed that media messages reporting serious illness might convince them that thermometer use is necessary. Others suggested that if cooking instructions specifically stated

to prepare food to a certain temperature rather than for a certain duration, thermometer use would increase. Most participants felt that there are several safe alternatives to the use of a thermometer, and also felt that using a thermometer is no guarantee of safety in any event.

A description of the responses to each of these barrier questions follows below.

1) When Do You Use a Thermometer?

Roughly half of the senior citizen participants in both Richmond and Baltimore stated that they have used or do use meat thermometers when cooking. Very few young parent or young adult participants in either city have used thermometers for cooking. Participants in all groups agreed that thermometers are most often used when preparing large items such as a turkey, a beef or pork roast, or a ham. (R1, R2, R3, B1, B2, B3) Participants in Richmond stated that they also use a thermometer when preparing something that they do not cook very often, or that they have little experience with cooking. (R1, R2) One Richmond participant stated that in addition to the reasons listed above, she uses a thermometer when the cooking time is over two hours. "If it's going to take a couple of hours . . . Especially for something that you're unfamiliar with and that you don't cook very often." (R1)

Many participants stated presentation of the turkey at Thanksgiving (i.e., the way the turkey looks) is a reason to use a thermometer. Several people stated that their standard method for checking doneness, cutting into the meat to do a visual check, is not appropriate for Thanksgiving since it ruins the appearance of the bird. Several women suggested that there is tremendous pressure on the cook at Thanksgiving to prepare the turkey properly. One participant stated that if her mother-in-law is present, she will use a thermometer to ensure the turkey is cooked properly. (B1, B3, R1, R3) Cooking for a larger group of people than normal was also cited as a reason for using a thermometer. One senior citizen participant said, "I think when you use a thermometer, you are going to be cooking for more people. And most of us are one or two now, so we don't cook in large quantities all the time." (B3)

Several participants in all groups suggested that perhaps the most important reason for using a thermometer was to ensure the best possible outcome for the meal in terms of taste and perfect appearance. One woman in Richmond stated that she often cooks beef and pork longer than is needed. This often results in poor taste and a "dry" meal. "(To be safe) you sacrifice flavor, and maybe you don't need to." (R3) Another participant stated, "I know that I overcook a lot of times, when if I had a

thermometer, I probably wouldn't. And those juices, when they dry out, all you've got is cardboard . . ." (R3)

A Baltimore participant suggested that when eating steak, the risk is low for E. coli, but that to ensure your meal turns out how you prefer it, you could use a thermometer. "If you just buy a steak, and just cook it and don't grind it up, you're probably not going to get (sick) anyway. So a thermometer isn't going to help you anyway, really, except if you like it to be nice and moist." (B2) Many participants agreed that the thermometer's best use was to check for doneness but that safety did not factor into the thought process. "I mean it doesn't really cross my mind from a safety standpoint. It's just to see how warm it's getting in the middle, to use it as a judgement of how done it's getting." (B2)

Other reasons cited for using thermometers include:

- Preparation instructions state to use a thermometer (R2)
- Mother or grandmother suggests using a thermometer (R2)
- Saw a chef using thermometers and was impressed (B1)
- To double check on the visual or other doneness check method (B3)
- "I feel better knowing I'm eating food that's been cooked to the right temperature" (R3)

2) What Would Keep You from Using a Thermometer?

The perception that using a thermometer is inconvenient was the main reason cited for not making use of this tool. Respondents in all groups stated that using a thermometer was an extra, unnecessary step (R1) that constituted a "hassle." (B1) "It would take five minutes to go in the drawer, hunt up a thermometer, and stick it in." (R1) Another Richmond participant stated:

Even if you're home trying to cook a quick meal, you're thinking how fast can I get this done. It's not, 'Well gosh, we really need to put a thermometer in something.' It's rare that you get one night a week where you're all sitting down at the table. And especially as your kids

get older, one's going to be at basketball practice, one's going to this, one's going to that. (R1)

Several participants stated the using a thermometer is too labor-intensive to be practical. Others complained that the need to open the oven to check the thermometer was problematic. The process, they worried, cooled the oven by letting out heat, thereby prolonging cooking times. (R2, B1) One Baltimore young adult stated, "I can't imagine going to such lengths every day." (B2) A Richmond participant rhetorically asked that since she was an experienced cook, why should she take the time to use the thermometer? (R1) Laziness was cited in both cities' young adult groups as a reason not to use thermometers. As one Richmond youth stated:

I think it goes back to what you were saying, when people are lazy. I know that I'm essentially lazy in the kitchen; I'm just hungry, I want food now. Or you're in a rush, you might not be lazy. I just want to eat. There's so many people like that. All I want is food. I don't want a hassle. (R2)

Cooking individual portions is another reason cited for not using a thermometer. Many participants in all groups agreed that when cooking something like a pork chop, a chicken breast, or a hamburger, the size of the food item limited the practicality of using a thermometer to test doneness. "If I'm making a chicken breast, I mean, it's only this thick [participant holds thumb and forefinger one inch apart], it's not worth getting (the thermometer) out." (B2)

Many participants in all groups were convinced that they had no reason to use a thermometer. "By now, you pretty much know you like your chicken breast or you hamburger as such. You can kind of see that. You don't really need it." (B2) Many participants believed that thermometers simply reconfirm what other sources of information already have conveyed. "All they seem to be doing is just reassuring. I mean that they don't seem to be telling you anything different than your senses do. You don't need an extension of your senses, so to speak." (R2) Most participants felt that they had enough experience cooking to be able to tell when their food was ready by other means, such as visual or olfactory tests.

In both groups of young adults, participants stated that if they were to get a foodborne illness from eating undercooked meat or poultry, they would most likely avoid eating that same food in the future rather than changing their cooking habits to include the use of a thermometer. "If I don't use a meat thermometer and I get sick off of chicken, or fish, or turkey, or whatever, I'm just the type of person, if I get that

violently sick from eating it, then I won't eat it again. I won't go out and buy a thermometer, I just won't eat it again." (R2) Another respondent stated, "I think I'd become a vegetarian first (before using a thermometer)" (B2) One Baltimore participant added, "If my grandma died from eating chicken, then I would probably be more inclined just to not eat chicken." (B2)

Several respondents in the senior citizen and young parent groups thought that using a thermometer might create a false sense of security during food preparation. (R1, B1, B3) "So I've got this thermometer in one particular spot, I don't know whether heat radiates to that spot. I don't know." (B3) Since many participants did not know that correct temperatures for different kinds of meat, several thought that using a thermometer would really do little good in terms of food safety. "I'm just saying because none of us really knows the temperature, it's still not going to help us. They may be easy to use, but unless we know what it's supposed to be, using those is not going to help us." (R1, B1)

Several other comments regarding reasons for not using a thermometer were offered. They are listed below:

- Never gotten sick from not using one, so why change? (R2)
- Not knowing how to use the thermometer (R1, R2)
- Do not currently own a thermometer (B1)
- Never used one before (B1)
- Broke a thermometer when using it in the past, and ruined the meal, therefore will not use one again (B1)
- Never think to use a thermometer (R2)
- "It's not that you're purposely avoiding work; it's—you just don't think about it" (R2)
- Not concerned with health issues (R2)
- The thermometer is an added expense (R2)
- "I'm not a technical person." (B1)

- Using a thermometer would be “anal retentive”
- “It would be anal retentive. It just seems like there is so much you’d have to do. I mean first to prepare it, and then to look at a thermometer. I just couldn’t imagine this. Who has time to use a darn thermometer? Not in my lifestyle.” (B2)

3) What Would Convince You That a Thermometer Should Be Used?

Several participants in each group indicated that if they heard of serious foodborne illness cases that could have been prevented by using a thermometer, such information may convince them to use a thermometer in the future. (R1, R3) Richmond participants in general felt that a media blitz promoting thermometer use and featuring a famous personality would be convincing. (R3)

Most participants in all groups agreed that if it could be shown that thermometers are easy and convenient to use, such information would be persuasive in increasing thermometer use. Comments such as “if it were user-friendly,” and “if it required no thought” were common with the young adult groups. (R2, B2). One Richmond participant stated, “If somehow they could twist logic into saying that it’s more convenient to use that. Put it in there, walk away. Don’t worry about flipping the meat, or don’t worry about doing anything except looking at that thermometer.” (R2) Another participant suggested that increasing thermometer use could be accomplished by convincing people that they will save time when using a thermometer. “Maybe if it’s some sort of time saver, in that you realize that you reach a certain temperature in a shorter time than you think. So, you don’t have to cook the food as long as you thought. It’s actually ready before you thought.” (R1) One participant in Richmond summed up the general feeling of the young adult participants when he said, “The only way I would ever use one is if it were as convenient as not using one.” (R2)

By far, most participants agreed that the best way to promote the use of thermometers would be convincing people that their meals will taste better if thermometers are used. If thermometers are promoted as the surest way to guarantee gourmet results in cooking, most participants agreed that they would be more likely to use them. “If they presented (thermometers) as being the most flavorful or it added to exact peak in terms of taste,” was one participant’s feeling. (R1) Other participants stated that they would use thermometers to know when something was done, for quality reasons rather than safety reasons. The following conveys this opinion: “To be sure that

something is done. I think you'd have to say it's the ultimate in knowing if it was cooked." (B3) A young adult in Baltimore stated, "If I'm paying more for a roast because it's supposed to be a choice cut of beef. . . I'd feel confident that it's going to be safe the way I cook it. I'd be more concerned about how well I would cook it, you know, for taste purposes." (B2) Several participants in all groups suggested that if cookbooks and recipes directed the use of thermometers to ensure quality cooking (rather than some duration of time at a given oven temperature) they would follow those directions and therefore be using a thermometer. "I've got a couple of recipes and a couple of cookbooks in the kitchen that say, cook the meat until this temperature. And that would be the only time I would use it. That is the way it is in the recipe." (B2, B3)

One participant in Richmond worried that overcooking foods could release certain toxins and make a meal just as harmful as undercooking it. She suggested that this might be one persuasive message for using a thermometer:

When I think about it, they tell you at what moment on the news to make sure that you cook meat at a certain temperature But then my mother's always saying, 'Okay, make sure that the meat is well done.' And she always likes a rare steak. Until the other day she said she saw it, and it looked a little pink. She said, 'Well, I saw on the news the other day where they said overcooking it can release certain toxins. Carcinogens. And they said the same thing about putting turkey cold cuts in the microwave, it releases certain toxins. So it was like, 'OK, if you overcook it or you undercook it either thing can make you sick.' I'm not a chef, I'm not going to be perfect. My thing is to always be sure. I'd rather overcook it than undercook it because that's what I'm afraid of. But I mean if they're saying that you can also get sick or whatever overcooking it, I mean, what are you supposed to do? (R1)

Several participants thought that if their children asked them, or pressured them, to use thermometers at home, they would. As one Richmond parent stated:

This may be a stretch, but I think that if children in schools, just like changing to the food pyramid. I have my daughter who's coming home from school telling me this is what you should be eating and this is what you should be doing. When everything new comes about and if they really push it in the school system, it means you have a certain degree of certainty when my second-grader is coming in saying that.

I think that reaching kids when they're younger, when their minds aren't set like ours maybe are already, that maybe that could lean them towards cooking that way, towards more safety. They watch what you do and they tell you when they think you're doing something wrong. 'Now my teacher told me such-and-such.' (R1)

Most participants in the young parent groups believed that teaching children at an early age would be one way to instill the use of thermometers into their future cooking habits. (R1, B1). Other comments on what would convince participants to use thermometers included the following:

- If it were shown that only the use of thermometers could prevent sickness (R1)
- If the use of thermometers is included with preparation instructions (B1, B2)
- If Oodonna Matthews (spokeswoman) endorsed the use of thermometers (B1)
- If you could be sure that the thermometer was absolutely correct (B1)

4) Are There Safe Alternatives to Thermometers?

Most participants in all groups believed that there are a variety of safe alternatives to thermometers for ensuring that your meat or poultry is properly cooked. Most felt that even if a thermometer is used, one or more of these alternatives should also be used. The most prevalent of these alternative methods is simply cutting the meat or poultry open and looking at the internal color. (B1, B2, B3, R1, R2, R3) Nearly everyone agreed that shades of red or pink meant that more cooking was required (with the exception of steak). "Even if I did use a thermometer, I would still cut it open. But I just wouldn't just say, 'Oh, it's done, okay.' I don't think I would rely solely on a thermometer." (B2) One Baltimore parent stated, "I'm a big fan of hacking it open and looking inside. That's tried and true." (B1) A Baltimore senior stated, "I always slice it, always, always. I still test it. So you have a back up also." (B3)

Experience (R1, B1), good instincts (R3), mother's advice (R1), and trial and error (R1) were all offered as "safe" alternatives to using a thermometer. As one Baltimore parent stated, "It doesn't take a rocket scientist to make dinner. It just takes an

observant person to watch what's going on, to do it enough times, to see how it's supposed to come out, and to have the family say, 'Yuck,' when it doesn't turn out right." (B1) Faith in the government and other "watch dog" institutions was also cited as a safe alternative to using a thermometer. "I think I have faith that government regulations are reasonable in terms of what is safe." (R1)

The following alternatives were listed in addition to those discussed above in answer to this questions:

- Experience gained by using the same oven repeatedly (R1)
- Trusting your butcher's recommendations for preparation (R1, B1)
- Your own perception of where you buy your meat (R1)
- The color of the meat (R1)
- "Feel it, touch it, look at it" (R3)
- "Time and temperature" (R3)
- "Wiggling the leg. If it's loose, it's done" (R3)
- "The smell tells you it is close to being done" (B1)
- "When it looks done, it's done" (B1, B3)
- Cook in a plastic oven bag (B2)
- Follow cooking guidelines (B3)
- Press the meat with a spatula to test for springiness (B3)

5) Does Using a Thermometer Guarantee Safety?

Uniformly across groups and cities, participants agreed that using a thermometer is no guarantee of safe food preparation. While people said they would feel safer using a thermometer, one young adult in Richmond conveyed a shared opinion when she

simply stated, “It doesn’t seem like the thermometer is a guarantee.” (R2) As one Baltimore parent stated:

I think in our modern society we want things to be 100 percent fool-proof. We want somebody to be responsible when it’s not, you know. And it really isn’t. I mean, we have to just do the best we can do and try to get as much knowledge as we can, and learn to process our own food and take care of it as safely as possible. (B1)

Several reasons cited for not considering thermometers fool-proof included the possibility of meat or poultry being bad prior to it’s being cooked (R1), and the feeling of a false sense of security when using a meat thermometer (R1). Several other comments discussed how food safety is not a priority (R1):

It’s just not something I think about when I cook. I mean, I think of, is it done, and is it going to taste good; not is it safe. I don’t run my life that way. I’m really only interested in cooking, getting it done, and eating it. And I’m — yes I’m cautious, but I’m not as cautious as you know, maybe some women or my wife. (R1)

Many participants felt that the thermometer would be an added tool that could complement the methods already used in the home to assure the safe preparation of meat and poultry. One participant in Richmond summarized his feels as such:

Let’s say we’re cooking a chicken or a turkey, and the internal temperature has to be 215 degrees or whatever. And your thermometer says 215, and you cut it, and you don’t think the juices are (clear). Are you going to eat it or are you going to cook it some more? You cook it some more. It’s still common sense. (R1)

C. Managing the Cooking Process

Questions around the actual use of a thermometer for cooking centered on managing the cooking process. Respondents were asked to explain how they have used meat thermometers in the past and to describe their experience with the tool. The process of using the thermometer, start to finish, was elicited from participants as was knowledge regarding different safe temperatures for various meat and poultry, and whether or not differences led to confusion during the cooking process. They were asked to describe where they acquired their knowledge on the subject. Respondents were also asked if they would consider using

a thermometer with some food products but not with others, and to explain any rationale for this decision. Respondents were then asked to respond to a hypothetical situation in which they were to use a thermometer to test the doneness of 20 or more hamburgers on a grill. Answers and reactions to each of these topic areas are discussed below.

1) How Do You Use a Thermometer?

Many of the participants in each group had never used a meat or poultry thermometer prior to attending the session. Those respondents who indicated that they had previously used thermometers were asked to describe the process. Two distinct patterns of use were reported: 1) putting the thermometer into the food prior to cooking; and 2) putting the thermometer into the food following cooking. With few exceptions, there was moderate confusion as to the proper methods for using thermometers when cooking. The following exchange demonstrates this confusion:

Moderator: What's the process?

Participant 1: Stick it in the center—

Participant 2: You don't stick it in when you put it in, do you?

Participant 1: No.

Participant 3: No. Wait until—

Participant 1: We usually wait about ten minutes before, and you stick it in to see if it — isn't that how it is?

Participant 4: I don't know.

Participant 5: I don't even use it. (B1)

Most participant who were familiar with using a thermometer indicated that the probe of the thermometer should be placed in the thickest part of the meat, away from any bones. Several participants in both of the young adult groups expressed concerns that the food they cook is so thin, there would not be a portion of the food thick enough to properly test the temperature.

Prior-to-cooking advocates described a process that involved sticking the thermometer into the meat prior to placing the food in the oven. (R1, B3) “The thermometer you stick in when you put it in the oven to begin with. You stick it in when you put in the meat. It doesn’t do any good if you stick it in at the end.” (R1, B3) Participants described putting the thermometer into the thickest part of the meat. “You can get a roast. They’re usually, you know, thick. So you want to put the thermometer pretty much to the middle of the meat, because that’s where you’re determining if it’s medium or well done.” (B2, R1, R2) Avoiding the bone was described as important (R2, B1) “You know that you’re not supposed to put it near a bone (Instructions) tell you put it down into the densest part of the meat” (B1) Users also indicated that they had to open the oven to check the gauge periodically.

Those who discuss using the thermometers following the cooking process described a similar process of placing the thermometer into the densest or thickest part of the meat. “I typically don’t even use it until the end of what the cookbook says. I’ll put it in for the prescribed length of time that experience tells me that I know how long it takes to cook a chicken, I’ll put it in there. And when I get ready to pull it out, I’ll just take the thermometer and insert it at that time.” Several participants emphasized keeping the end of the probe clean, especially after initial testing of meat temperature. “Just sticking some metal spike into my meat, I mean, I would want to have it sterilized. Of course you clean it.” (B2)

2) Is it Different for Different Kinds of Meat?

Nearly all participants agreed that there are different procedures and safe temperatures for different kinds of meat and poultry. Poultry, beef roasts, hams, turkey, and meatloaf were all mentioned as items on which a thermometer would be used. Nearly everyone in all groups agreed that using a thermometer would not be practical with smaller food items such as hamburgers and pork chops. Interestingly, in the Baltimore senior citizen group, no participants had an opinion one way or the other on this issue. (B3)

3) **Would You Use it with Some Meats and Not with Others?**

Most participants agreed that they would only use a thermometer on larger items such as roasts and turkeys. “If it were a roast that’s eight inches around, you know, sort of cutting it open every two hours to see how done it is Yeah, at that point I would use a meat thermometer.” (B2) Senior citizens in Baltimore also mentioned using a thermometer with pork roast, although not with pork chops. (B3)

4) **Are There Different Safe Temperatures for Different Meats?**

Most participants realized that there are different safe temperatures for different meat and poultry products. Few, however, knew definitively or even accurately what temperature was safe for what product, as the following exchange demonstrates:

Moderator: Does anyone know what the safe temperature is?

Participant 1: 350 degrees, or something?

Participant 2: 400 — 400 internal degrees, I think? A shot in the dark.

Participant 3: Well, I mean obviously, the safe temperature, chicken has to be cooked more because people eat beef all the time raw, or rare. Beef, there’s people eat it rare, or raw. (R1)

Participants in Baltimore were equally as unsure as to what constitutes a safe temperature for different meat and poultry products:

Moderator: Are there different safe temperatures for different meats?

Participant: I think there is. I think there’s a like rare point at like 130 degrees or something like that. You know, in the center o the piece of meat has — You go up to 140 or 155, you’re just getting to different points.” (B2)

Some other comments about temperature included:

- Chicken should be cooked at 180 degrees (R2)
- 160 degrees for chicken (R3)
- When in doubt, overcooked is better than undercooked (R3)
- “When they say—when they give you a temperature to cook your meats to, it’s usually above and beyond. I think it’s once you’ve reached that temperature it should have killed everything that’s inside.” (B1)
- “Absolutely, there’s definitely a different temperature range for a different type of meat. I think 160 degrees comes to mind for chicken, 160 or 170. And I think poultry is—I’m not positive, but I think the poultry was a little bit higher temperature than the red meat, but that may be just the opposite of that. I’d have to look again, but I always double check to make sure that whatever it is, that I get it to the right temperature.” (B1)
- “Sure. Yes. Sometimes the meat will determine it, and how you want it. Some meats take long, like pork. It takes longer and you have to use a certain length of time to do it.” (B3)

When asked how the participants learned about these different safe temperatures, the following responses were elicited:

- Cookbooks “I’ve been cooking for over 40 years and I still go by cookbooks.” (B3, R1)
- Recipes (R1)
- Instructions written on the package (R1, B3)
- Pamphlets (B1)
- “You just know” (B3)
- Experience (B3)
- “Old wives tales” (B3)

Most participants agreed that the difference between safe temperatures for different meat and poultry products was not confusing. Individuals cited double checking with recipes (B1), falling back on past experiences (R3), and using recommended temperatures simply as a starting point (B3) as reason for not considering the differences confusing.

When asked if there was an easy way to keep track of the temperatures, several participants suggested that having a refrigerator magnet that posted which temperatures went with which meats would be helpful. (R1) “My memory for anything is zilch. I have to refer to something for everything. But you know, you’re going to basically be cooking in the kitchen. So, something that you can put on your refrigerator or your oven top or something would probably serve me well.” (R1) Other suggestions included:

- Advertise on television with a catchy jingle (R1)
- Put a big sign in the meat department in grocery stores (R1)
- Place suggested temperatures on the food packaging (R1)
- Design something that is easy and convenient with a thermometer and the degrees but not a lot of words (R1)
- Create a color-coded system that identifies a certain color with a certain temperature (R1)
- “Probably on the packaging, color coding mixed with — you know, pork, beef, and chicken. Three different colors, three different temperatures, and just repeat it everywhere you look.” (R1)

5) Hypothetical: Describe the Process of Cooking Burgers for 20

When asked how they would manage the process of using a thermometer to check 20 or more hamburgers on an outdoor grill in a picnic situation, participants in all groups had mixed reactions. Several people described a process of sticking the thermometer into each individual burger (B3), although this suggestion created some discussion regarding its practicality. Many participants felt that checking the doneness of a few, or even just one, hamburgers would be adequate. Checking a burger in the middle of the grill and one on the edge of the grill was suggested in several groups. (R1, B1) “I probably wouldn’t check them all, but I’d check at least quite a few at various

places. Because you know the ones in the middle are probably going to be the hottest, and it's around the edges that I would be the most concerned. If you check the ones around the edges, you're guaranteed the ones in the middle in all probability will be done." (B1) Several participants suggested testing just one burger would be adequate. (R1) Although they were asked to comment specifically on thermometer use in this process, testing for doneness in this process did not always constitute using a thermometer for many participants. When asked to describe the process, the following represents the general sense of how this task would be accomplished:

Moderator: Is there a way that you can do hamburgers for 20 and use a thermometer to check for doneness?

Participant 1: No—

Participant 2: If you weigh that. If you weigh each hamburger, and it's the same weight, that's all you have to do is test—do one with one of the thermometer.

Moderator: Would testing one be adequate?

Participant 1: I don't think so.

Participant 2: Because if you're going to cook it—cook it at the same time --

Participant 1: The coals aren't always even—

Participant 3: It's in the heat to begin with. You know, you have to—if the meat is good meat and you've prepared it properly, and you're going to make your hamburgers, the heat of the --whatever you're using is going to kill anything in there anyway. And you know how long it takes to broil a hamburger, or bake one. Test it.

Moderator: How?

Participant 1: With a fork.

Participant 3: Cut it open, cut it open.

Participant 1: Plus you've got 30 hamburgers for 30 people.

Participant 2: And usually—

Participant 3: Yeah, I always cut it open. I just (indiscernible) a little slice.

Participant 4: The same with a hot dog.

Participant 1: And turning, I think it's an important way too. (B1)

Most participants agreed that there would not be a need to check each and every burger. “I wouldn’t think you would need to check all of them. I mean, if everything is relatively the same thickness, if you just check one, provided you have even heat distribution in your oven or your grill, you can relatively safely assume that they’re all going to be done the same, just by checking one.” (B2) Many participants stated that they believed using a thermometer in this scenario was unpractical and unrealistic. Most thought that checking one or a few burgers via visual means would be sufficient. “I mean, it’s a lot easier to cut one open and say ‘It’s done.’” (R1) Another participant stated, “I guess it’s my grill, that it gets hot enough, and that I see dark on the outside. And I will take one, cut it open and ask someone, ‘Is this pink enough? Or is this too pink?’ How dead do you want it, basically.” (B2)

In both cities’ young parent and young adult groups, participants indicated that they would not bother using a thermometer when grilling large numbers of hamburgers. “It wouldn’t happen,” one Richmond parent stated. The fact that hamburgers are traditionally thin was cited as a reason not to use a thermometer during preparation. “You would not use a thermometer with hamburgers. The hamburgers would be too thin,” (R3) and “I wouldn’t bother. Because the thickness—you know, flip it on one side, and then flip it over on the other side. And when you cut into it you’ll see if it’s done or not.” (R2) One Baltimore young adult said she would change her plans rather than use a thermometer to check for safety. “I would even—I’d have to cancel the tailgate party, or I’d do cold cuts or something.” (B2)

One parent in Baltimore suggested that a more important question would be how to check the doneness of 20 hamburger if you did not have a thermometer available:

Because if you’ve got one, you’re going to check them. You probably wouldn’t have one if you’re out at a cook-out though. You’re probably not going to typically take a thermometer with you . . . to a tailgate. You’re going to sit there and you’re going to cook

them. And if you were—if you're all concerned, then you're going to probably err on the side of over-done. (B1)

Two other comments are worth noting on this issue. One participant felt that since he used a gas grill rather than a charcoal-burning grill, he was ensuring more safety in his food preparation. (B3) One Richmond senior citizen suggested using the thermometer on the charcoal coals themselves to ensure the fire was hot enough to properly cook the hamburgers. "Turn the thermometer the other way and make sure your coals are hot enough." (R3)

D. Choosing a Thermometer

In general, consumer knowledge of thermometer types, features and options was limited. Many participants, especially in the senior citizen groups, were aware that there are two typical kitchen thermometers: meat and candy. Two participants envisioned traditional medical thermometers for human use when describing features and expressing concerns over the use of thermometers in cooking. As one participant stated, "I was taught as a child that if it breaks, you touch the mercury in it, mercury is poison." (R1) Very few of the participants in the young adult and young parent groups in both cities had experience using thermometers in cooking meat or poultry, with the exception of using a thermometer when preparing a Thanksgiving meal. Most participants in all groups thought that thermometers are easy to use. They expressed concerns, however, as to whether or not using a thermometer would guarantee their food preparation was adequate.

Most participants agreed that thermometers come ready to use when purchased, that they read temperatures accurately. Cost estimates for various thermometers ranged from \$1 to \$100, with most participants agreeing a good, reliable thermometer could be purchased for between \$5 and \$10. Participants in all groups overwhelmingly favored the standard meat thermometer with the large dial and the temperature information printed on the thermometer face. Participants cited many negative features about models other than the standard "old fashion" meat thermometer. Details on these issues follow below.

1) Types of Thermometers, and Ease of Use

Participants in the young parent and senior citizen groups in both cities recognized two major type of kitchen thermometers: meat and candy (B1, B3, R1, R3). In general, participants had seen thermometers in a variety of stores, and knew that a variety of types were available. "I've seen them at the Giant when you're down the

aisle. And they have all different types.” (B1) One Baltimore parent explained that when he bought a grill recently, several “stick button” thermometers were included in the purchase. “Disposable, varying lengths, little probes. Stick buttons that you can put on a steak on the grill, and it’s very small.” (B1) Several participants indicated that they would be interested in a thermometer that could be placed on a steak, hamburger, pork chop or other thin item. “(If) they could come out with a strip or something that you put on top of a hamburger and that give you an overall (temperature). Like a long piece of aluminum foil that turns color as the thing is done.” (B2)

In all groups in both cities, participants agreed that thermometers were relatively easy to use, but several cautioned that one must know how to use the thermometer properly. “Sure, if you’re capable to use it the right way. You have to pull it out of the oven and it can’t be near the bone.” (R1) Another participant stated, “It’s easy to operate. It’s probably difficult to perfect a technique.” (B1) One young adult in Richmond suggested including disposable thermometers inside meat and poultry packaging, with directions included for their use. (R2)

2) Safety

Most participants in all groups believed that using a thermometer will not guarantee that the meat or poultry they serve will be safe. “I don’t think you can ever have that guarantee.”(R1) Most participants agreed that there is a perception when you buy a thermometer that it will be accurate and reliable right out of the package. “I mean, you’d think it was right. It’s like a thermometer you bought that takes your kid’s temperature. I mean, you’d have to assume it’s right.” (R1) Another young parent added, “You assume the manufacturer is correct.” (B1)

Some participants voiced concerns about the accuracy of thermometers, and discussed ways of measuring that accuracy. “You know, it’s like your scale. They don’t match your doctor’s scale. So is your thermometer really going to be right or not?” (R1, B1) Participants in each group in both cities suggested that thermometers could be tested, and several ideas existed for ways to be sure a thermometer is accurate. “I would stick it in water that just starts boiling, because there is a set temperature that water will start boiling, 212 degrees.” (B2, B1, R3) One participant suggested sticking the thermometer probe under her tongue. (B2)

One participant felt that after a few years, any thermometer would no longer accurately read a temperature. “You could probably have a thermometer for three of

four years. Probably the second year it isn't worth a darn." (B3) Another respondent expressed his frustration with food safety in general when he stated, "If we can take the temperature of the planet Mars, we should have the technology now to take the temperature of a hamburger" (R3)

Many participants agreed that thermometers can be calibrated if they are inaccurate, although few participants knew how this could be accomplished. Another participant added, "We assume they (are right). They don't tell you you have to calibrate them." (B1) Several participants suggested using experience to adjust for any inaccuracies. "You can figure yourself what would be the proper temperature—subtract 10 or 20 (degrees)." (B2)

3) Cost

Participants in all groups thought that reasonable prices for thermometers ranged from \$1 to \$100. These prices were offered prior to any participants examining the model thermometers. Following the examination of the various thermometer models, participants' reasonable price range changed to \$2 to \$50 dollars. Some individuals thought that restaurants would pay a higher price for thermometers than would consumers. "I'm sure the restaurants can probably pay \$30, \$40, \$50 for a thermometer." (B1) Some participants agreed that they would be willing to pay more for the Cooper Thermal Timer (#DTT361), a large digital thermometer. The price range was between \$2 and \$12 for the other models (Taylor 5989-smaller dial; Taylor Meat Thermometer-"old model"; DigiDial 300L-small digital). One participant in Baltimore stated, "If you went to a place like Williams Sonoma, they charge you \$80 for it." (B2) While some individuals thought that any price would be too high for a thermometer of any kind ("I would have no idea what one would cost. It's just not one of the tools I would buy at all for the kitchen." (B1), one participant stated, "If mine broke, and I needed one, and it was \$10 or \$12, I rely on it. So I would spend anything for it; it's a tool." (B3) By group, the following were offered as price ranges for thermometers:

B1: \$2; \$3; \$5; \$10; \$12; \$20; \$30; \$100;

B2: \$2.⁹⁹; \$3; \$10; \$11; \$12; \$20; \$30; \$35; \$40; \$45

B3: \$1.⁹⁸; \$2; \$2.⁹⁸; \$3; \$7; \$7.⁹⁹; \$8; \$10; \$12; \$12.⁹⁵; \$15

R1: \$2; \$7; \$9.⁹⁹; \$10; \$15; \$25

R2: \$5; \$8; \$10; \$12; \$15; \$20; \$30; \$40; \$50

R3: \$4; \$5; \$6; \$7; \$7.⁵⁰; \$10; \$15

Participants stated that they trusted brand names when buying products such as thermometers, and that this was one way they would make a decision as to which thermometer was “best:”

I have a little trust in the fact that, if you buy a quality—you know, a typical brand name—I don’t know what a brand name for a thermometer would be but, if you pay a dollar for it versus a couple dollars, or eight or ten, you may be getting a little bit better quality and hopefully quality control. (B1)

They also thought the inclusion of instructions for use would be a key selling point and would influence purchase decisions. When given a choice between two comparable items, “I would compare the instructions on both packages.” (B3)

4) Thermometer Models

The overwhelming favorite thermometer model among all participants in all groups was the Taylor Meat Thermometer (commonly called the “old” model). Participants liked it because, “It is easy to see,” and “It is not intimidating.” (B3) The following exchange was typical when participants discussed this model:

Participant 1: I like the old-fashion one.

Moderator: What are some features about this that are good?

Participant 2: It has the words on that.

Participant 1: You don’t have to know what temperature; you just go to poultry.

Participant 3: It’s easy.

Participant 4: It’s durable. You don’t have to replace batteries(R2)

A similar exchange unfolded in a different group:

Participant 1: This one's better in a way than the rest of these, because it actually tells you.

Participant 2: That looks just like the one that I have.

Participant 1: It gives you the category, you know.

Participant 2: Right.

Participant 3: Beef medium, beef rare, ham.

Participant 1: This would be good if you didn't know the temperatures. (B2)

A few participants preferred the Cooper Thermal Timer (DTT361), a large digital timer with the thermometer probe attached to a long braided cord. The following exchange related to this model:

Participant 1: I like that one. I really like that one.

Moderator: All right. You're pointing out the digital one with the long cord. What about that is appealing?

Participant 1: Because I can see it from outside (the oven).

Participant 2: That's wonderful. I mean the oven is on and I don't have to see what's going on there.

Participant 3: It's programmed.

Participant 1: It's outside the oven. (B3)

Participants thought that since the meat and poultry types are printed right on the large Taylor model, it was the easiest to use of the models presented. Several participants in all groups thought the models with thinner probes (Taylor 5989 and DigiDial 300L) would be easier to stick into meat and poultry than the bulkier old Taylor model. (B2)

When asked what feature of any of the test models were attractive to the participants, the following comments were offered:

- The Taylor states what the proper temperatures are (B2)
- The DigiDial gives the perception that it will work more quickly (B2)
- The Cooper Thermal Timer is better since you don't have to open the oven to use it (B2)

When asked to discuss those features that would dissuade participants from using the demonstration models, the following answers were provided:

- You have to punch in too many numbers (Cooper) (R1)
- The numbers are too small to read (Taylor 5989) (R1, B2)
- The readout is too small to read (DigiDial) (R1, B3)
- The thinner probes seem too small (B1, B3)
- The probe is too thick and bulky (Taylor) (B2)
- The computerized thermometer is confusing, and can't be read without glasses (B2, B3)
- "I wouldn't depend on a digital" (B3)
- The small digital thermometer (DigiDial) could fail if the batteries fail (B3)

E. Behavior Modifications

Participants were asked to discuss several questions and issues related to food safety messages and how such messages could best be conveyed. Specifically, they were asked to discuss whether or not they felt they could safely prepare foods to their personal tastes without compromising safety, what impact major national foodborne illness reports have on their personal consumption practices, and what information would encourage consumers to use thermometers. By and large, in all groups in both cities respondents were less than enthusiastic about using thermometers while cooking. Many felt that they have been cooking without a thermometer for years without suffering any adverse results. One participant said that after participating in the group, she would be more likely to use thermometers in the future. Several participants added that they would go home and locate their thermometers, taking them out of “the drawer” and attempt to use them in the future.

1) Can You Make Your Food the Way You Like it and Have it Be Safe Too?

Many participants in both cities agreed that it is possible, even probable, that you can prepare your meals to your taste and be safe at the same time. “We do it all the time, and we’re still here.” (B2, B3) One Richmond parent added, “Yeah, it should, unless you like really rare meat.” (R1) Other participants stated that food safety depends on what you like and how you like it. Whether or not children are a concern also needs to be considered, as the following exchange conveys:

Participant 1: I guess it depends on if you like red meat.

Participant 2: It depends on whether the kids are eating or not.

Participant 3: Well, because the foodborne illnesses affect, they say, small children and the elderly much more severely than they do the rest of the age people. (B1)

Many people believe that taking care and responsibility for your own safety in the home is of the utmost importance. “The worst thing that actually killed me was somebody else cooking So usually, if you do what you’ve got to do, then you’re all right, if you do it yourself.” (B2) One Richmond young adult stated, “I think we could have a great meal and enjoy the meal and make it safe, too. But in essence, it still may not be safe. Just from back home, we were talking earlier about chemical

and injections. And so, you still really don't know." (R2) One Baltimore parent stated her opposition to using thermometers by saying:

In a certain way, with my sort of no-tech attitudes, I would rather learn what constitutes properly cooked food; what it looks like, what it smells like, what it tastes like, so that I can properly cook food anywhere I happen to be and I don't have to depend on this little thermometer that I might not have brought with me. I just know from looking. (B1)

2) What Impact Do Foodborne Illness Reports Have on You?

When asked if recent reports of foodborne illness impact consumer decisions about buying meat and poultry, one participant said, "Absolutely." (B3) Several participants in all groups talked about switching brands or discontinuing patronage of certain stores or products where problems had occurred. "We didn't go to Burger King for a while. I used to buy those hamburgers from Sam's. I had to switch brands. And I like them, I thought they were fine, but you know. We didn't want to take the chance of getting some bad ones." (R1) A Baltimore parent stated, "I purchase less meat. I didn't go to Burger King right after the Hudson meat thing for a while. You know, it takes a while; it's still in your mind." (B1) When asked to define "a while," the respondent said, "It wasn't that long ago, but until the media turns its attention on something else." (B1) Another Baltimore participant stated, "I don't buy pre-made hamburgers or stuff like that. I usually, when I buy meat or poultry I tend to if possible buy it fresh." (B2) One senior citizen stated that he will wait for official notice that a problem with a tainted product has been corrected before consuming that product again. "Well, it's got to come from a health department of some sort, saying that we now know exactly what the disease is, where it came from. We can contain it. Then I will go back to eating it. But until I get an "all clear," saying it is now safe to eat it, I won't eat it." (B3)

Several participants in both cities stated that they believe the United States has high food safety standards and is a relatively safe place for avoiding foodborne illnesses. "It makes me feel pretty safe. I mean, if you guys have ever been to South America, eaten there, I mean people would be a lot less critical of the food that we eat here. I mean, we've got a lot of money in this country and the food we eat is pretty good." (R2) Other participants were more skeptical about the food safety news that they receive, as the following exchange illustrates:

Participant 1: I think it's all about dollars.

Participant 2: Yes, it is.

Participant 3: I agree.

Participant 4: And money talks.

Participant 1: Right.

Participant 4: And people lie to make money.

Participant 2: I wish we had something on FDA. (B3)

Participants felt that new media and reports heighten their awareness of problems for a time. In most of the groups there was some confusion as to who is protecting the public against foodborne illness. The government, the FDA, the USDA, individual food and meat packing companies, individual restaurants, and state and local health departments were all cited as sources of information and food safety messages.

3) What Information Related to this Topic Might Be More Persuasive to You in Terms of Getting You to Use Thermometers When You Cook?

In general people in all groups in both cities were admittedly reluctant to change any of their cooking behaviors to include using thermometers when preparing meat and poultry. Especially with young adults and senior citizens, individuals did not perceive a risk of contracting foodborne illnesses from eating undercooked meat or poultry, or they seemed willing to take the risk of contracting an illness rather than alter their standard food preparation behaviors. Baltimore participants discussed how changing behaviors can be a slow process, but not an impossible one. One individual related governmental advocacy for food thermometers to the government's initiative for seat belt use in automobiles:

Things change, people change. Maybe now it's the meat you have to watch out for. If they equated seat belts and the fact that you wear them now with using thermometers, and now it's time to start using one, then that might come the extra mile to convince me, too, the same way. The government chose to step in there. To make a law

that said you had to wear a seat belt, and I don't know if it'll happen with meat thermometers or not. (B1)

Many different incentives and ideas for behavior change were elicited from participants in all groups. One theme that ran through most groups was the fear of contracting a serious disease from eating undercooked meat or poultry. Informing the public through public awareness campaigns that describe and explain outbreaks of foodborne illness was thought to be a powerful motivator for behavior change. "It would probably have to be a lot of people (getting) sick. Sick enough to go to the hospital, and the doctor saying that, 'Well, your meat wasn't cooked at the proper temperature,' in order for you to use a thermometer." (R1) "It would have to be something really dreadful," one Baltimore parent added. Another Baltimore respondent stated, "It would be where people started dying from eating turkeys at Thanksgiving." (B2) Another Baltimore youth stated, "I don't know if there's anything that's going to force me—convince me to use a thermometer unless somebody close to you would die from it." (B2)

Several parents suggested that the best way to alter the behavior of household food preparers would be to promote the safety benefits for their children, as the following exchange demonstrates:

Moderator: If you just knew that the food would be safe if it reaches a certain temperature for your kids, would that be a message that would be more likely to make parents want to use (thermometers)?

Participant 1: Mm-hmm.

Participant 2: Yeah.

Participant 3: Yeah, most definitely.

Participant 4: Mm-hmm.

One parent in Baltimore, who indicated that he and his wife always check their meat and poultry with a thermometer to be sure it is done, related a story about a time when his children got sick. "You know, if there is any chance at all that my children can become sick—and actually, my children have become sick and been hospitalized And I think the impact of watching a . . . child having gone to the hospital.

That's why I look at it as, 'I'm not going to take the chance.'" (B1) One young adult in Baltimore also suggested that targeting young parents with a message of safe food for their children offered a strong opportunity. "Benefit their children. I mean, they never do it for themselves, but they would do it for their children. If I had kids, I think I would think about it more. If I was cooking for myself or my friends, I mean, I would not worry about it. But if it was kids or something, now" (B2)

Many participants in all of the groups thought that one strong incentive for using thermometer when preparing meat and poultry would be if recipes mentioned specific internal temperatures for the meat rather than listing oven temperatures and cooking durations. Cookbooks were mentioned as one important place to indicate proper cooking temperatures. (B1, B2)

Scientific studies and "credible" news and media reports were also cited as information that might be persuasive in terms of encouraging people to use thermometers. "Case studies where meat was cooked until it was done by visual inspection or what-have-you; but then there was a test done to show that the bacteria was still present versus cooking it to a certain temperature; and the same test done and showing that the bacteria is no longer present. Something like that." (R1) One Baltimore participant stated:

If they did a study that was not just some media junk where they're all screaming about everything's a big crisis. Like if there was a study that said there are a lot of unreported cases of this because at this temperature, this bacteria lives and will cause you this. If they said something like that on the news. (B2)

Several participants in the young parent group suggested that seeing strong food safety messages in science text books is a sure sign that the information is important and accurate. "From an educational standpoint, if it shows up in my daughter's textbook, you know, if it's in the science book from school, well, it must be true." (B1)

Advice to use thermometers that came from reputable sources, such as a doctor (B2), the government (R3), Good Housekeeping (B3), dieticians (B3), and the Surgeon General's office (B2) was mentioned as a strong motivator for behavior change. Advertisements in both print and television media were mentioned as particularly persuasive, especially when such messages included trustworthy spokespersons such as Peter Jennings or Oodonna Matthews. One Baltimore young adult contended:

If they put it on an ad, how some of these commercials do like, 'The Surgeon General tells you blah, blah, blah.' Well, if they did an ad saying that studies now show blah, blah, blah, that one third of all food poisoning would be avoided by the use of a thermometer because of the cooking temperature, and then they showed the thermometer, I guarantee you people would buy it. (B2)

Other suggestions included encouraging oven manufacturers to enclose a thermometer in every oven and range made in the United States (R3) and persuading the managers of grocery stores to use thermometers in their in-store cooking demonstrations (R3).

Several individuals expressed that they will never alter their behaviors, regardless of any message that will promote the use of thermometers. One Richmond parent stated, "I've been cooking hamburgers for a long time and haven't had a problem. So if somebody told me you've got to cook this steak until it's medium well, and I know I like it medium rare, and I've been eating it medium rare for twenty years or thirty years, I'm going to still take the chance." (R1) Another participant in the Baltimore parent groups stated:

There isn't any amount of information that would make me believe I had to use a thermometer. Look how long people have been around and cooking food. And 9 out of 10 times, or even maybe 99 out of 100, which is closer, people are fine. And we have that range of safety that's just within us in our health; the bacteria we can tolerate. And we generally live in hygienic environments. I think we're pretty safe, even without thermometers. (B1)

One Baltimore youth expressed his doubt as to whether or not he would ever change his practice of not using a thermometer. "I'm not going to, or have no intention of changing my ways right now. And I feel very confident in what I do cook, and that I do it correctly, so I don't feel the need for it. And you've got to put it in perspective. One of the largest outbreaks ever of salmonella in this country—I don't remember if it was cantaloupes. So, how would a thermometer help there?" (B2)

4) What Is the Best Way to Receive Such Information?

There were many creative delivery methods suggested for presenting some of the messages listed above to the public. Of these, popular media was most often

mentioned in all groups in both cities as the surest way to impart an important message. Most participants agreed that they receive most of their food safety information from television or in the news papers. “I guess the media has hyped everything; it doesn’t matter what it is. Every time you look or turn on the news or something, some kind of food scare. From bacteria, something.” (R2) Participants in Baltimore suggested that responsible media coverage with explicit proof would be a strong means of getting the message across:

A 20-20 expose showing that what you thought was done wasn’t. Here’s the proof. And let’s dissect it. That would probably prove a lot of people—I bet that would convince a lot of people. That you saw explicit proof; here’s two pieces of meat cooked one to the old wives version of it to look well done. Cut it in the middle, nicely done. I’m not saying I disagree with that method. I use it myself. But if you were to do that and then still dissect both versions, where you cut it to an exact temperature and then you show me what’s possibly still alive in this one (visual check), what is still alive or not still alive, in this one (thermometer check). I think something like that, an expose that’s done fairly, would probably go a long way to convincing a lot of people one way or the other. (B1)

Many participants felt that such a media message should be targeted toward older populations and homemakers who are caring for young children. “You’d have to target an older population than us. You can’t target, let’s say, from 25 to 35. If you could target a group, and I think you target it to homemakers. The person who stays at home, cares for the house.” (B2)

Other ideas for presenting food safety and thermometer use messages included the following:

- Kid’s and parenting magazines (R1, B3)
- Pediatrician offices (R1)
- Reader’s Digest and Consumer Reports articles (R1, B3)
- The evening news, PBS, Dateline, 60 Minutes, and Infomercials (R2)
- A holiday-based food safety awareness campaign (R2)

- Prominently displayed in grocery stores (R2, B3)
- In cookbooks and culinary institutes (B3, B1)
- On temperature chart magnet for the side of the oven or the refrigerator (B1)
- With testimony from experts and kids (B1)
- Make use of thermometer give aways (B1)
- On consumer safety food labels on meat packages (B1)
- “Use a good scary video like in drivers education” (B1)
- Create a hot line number to call for information (B3)

One Baltimore young adult stated a concern regarding food safety messages that is worth noting. He said:

I think whatever ad campaign came out, they were persuasive enough, people might start using the thermometers. And then they realize that they're doing pretty much the same thing they were doing before without the meat thermometers, and things are still working out the same way. So then they'd just stop using them; it'd wind up in the kitchen junk drawer.” (B2)

V. Discussion

The six focus groups revealed interesting information related to consumers' perceptions of thermometer use and the barriers to their use. With the exception of the senior citizen groups, participants seemed far less likely to use thermometers than is suggested by the Food Marketing Institution in 1997 and the Meat and Poultry Hotline in 1994. Seniors did report more experience and familiarity with thermometer use than did the young adult and young parent groups. Gender seemed to have only a small role in thermometer use and potential barriers to their use as well. Geography had little bearing on thermometer use, although it seemed to be important in terms of food safety knowledge.

Along with demographic distinctions, several interesting themes and issues emerged from the groups. While participants seemed aware of many important food safety practices, misinformation and misconceptions regarding thermometer use and general food safety were found. Several interesting dichotomies emerged in the study, each of which will be discussed below. These dichotomies represent important insights into consumer attitudes toward the foods that they eat and how they prepare those foods. Such information should be carefully considered prior to developing media campaigns, public service announcements, or other strategies for promoting behavior modifications.

Following the discussion of emergent dichotomies, recommendations based on findings will be presented.

A. Variations Among Participant Types

Age — The three group types (young parents, young single adults, and senior citizens) represented the food preparers for the three most at-risk populations for contracting foodborne illnesses (namely young children, young adults, and senior citizens). These three groups also represent various stages in the life course of the participants. The young adults consisted of participants who are at an early stage of cooking for themselves, while also at an age where they often feel invincible. Many young adult participants spoke of the possibility that they had previously contracted a foodborne illness without really even being aware that they had. Participants in this category often place themselves at risk through their poor food safety practices. Nearly all of the young adult participants in both cities stated that they would be unlikely to adopt thermometer use in the future, regardless of the message presented to them.

The parents of young children might be for the first time preparing food for those other than themselves. Habits, both good and bad, gained during young adulthood now have repercussions for others. Most participants in these groups spoke of their responsibility to protect their children's health and the impacts that responsibility had on their food preparation practices. This responsibility seemed to be a powerful motivator for behavior change, as many parents stated that they would use a thermometer to check the food they served their children, but not if they were just preparing food for themselves. Several participants in these groups already used thermometers, and many others indicated that they would be more likely to use thermometers in the future after participating in the group.

Participants in the senior citizen groups were once again cooking for themselves only, after having passed through a period of being responsible for others over a series of years. These individuals had relatively more experience with using food thermometers than individuals in the other groups. This might be a reflection of either how they learned to cook or the length of time for which they have been cooking.³ Senior citizens had been cooking for more years, had passed through various life stages, and had learned to cook at a period of time when families more likely dined together than they currently do, and when conveniences such as microwave ovens were not an option. While many participants in this category had used thermometers in the past, most agreed that there was little need to use thermometers at all. Experience was offered as the most important tool in determining the doneness and safety of the food they prepared. Very few senior citizen participants stated that they would be likely to use thermometers in the future.

Gender — Gender did not seem to be a factor in any of the groups. While in both senior citizen groups, women had more experience than men with the use of thermometers, this did not seem to be an important factor for food preparation or safety knowledge. In the young parent groups, as many men as women reported having used a meat thermometer. In both young adult groups, neither men nor women reported using thermometers prior to the sessions. The higher number of senior citizen women who reported using thermometers most likely reflects traditional gender roles and division of labor, where women of this generation were expected to be the “cooks.” One other interesting gender item was the discussion of chefs' admirable use of thermometers, and tacit assumption that the “chef” was male.

Location — The lack of use of meat thermometers and perceived barriers to their use varied little between the two locations. The Baltimore groups had better overall food safety knowledge and awareness than did their Richmond counterparts. While food safety

³ I. e., even if all senior citizen participants only used food thermometers to prepare Thanksgiving dinner, then by having prepared more Thanksgiving dinners than other participants, seniors still would be more experienced than young adults or young parents.

awareness in both cities could be considered high, it was also often inaccurate in terms of fine details such as proper cooking temperatures and causes of foodborne illnesses.

B. Distinctions of Note

During analysis of the transcripts for each group, several interesting dichotomies of thought emerged. Participants in all groups discussed their perceptions of barriers to thermometer use and overall understanding of food safety, and in the process articulated their thoughts and attitudes regarding cooking and food safety in general. Frequently individuals will not fully realize why they do or do not engage in certain behaviors and activities. The classifications and distinctions they discuss offer insight into those areas of concern that are capable of being acted upon. As such, recognizing and attempting to understand dichotomies in these discussions is of the utmost importance. Over the course of these six groups, eight important dichotomies emerged. They include: ease of use versus hassle; thick food versus thin; stove cooking versus oven; food doneness versus safety; moist food versus dry; cooking for self versus cooking for others; special event cooking versus regular cooking; and folk knowledge versus scientific knowledge. Each of these is discussed below.

Ease of Use versus Hassle — In each group in both cities there was concern that using a food thermometer constituted an added step that required additional effort on the part of the cook and would slow the cooking process. This “hassle” was a major barrier to peoples’ willingness to use thermometers. Most participants felt that this step was unnecessary since doneness could be determined in other ways. While nearly everyone agreed that the extra step constituted an inconvenience, most participants also agreed that thermometers are easy to use. In every group participants stated that there was nothing difficult about checking doneness with a thermometer. They agreed that an easy and foolproof method of making sure food preparers know the proper safe temperatures would be essential, suggesting an oven magnet or using a thermometer with the temperatures printed on the dial face.

Thick Food versus Thin — The overall size of food was an important barrier to thermometer use. Thickness and thinness seemed to be the biggest determinant as to whether or not a participant would be willing to use a thermometer on a given food item. Chops, steaks, hamburger, and chicken breasts all were considered too thin to “reasonably” test with a thermometer. “Thick” items, such as roasts, turkeys, whole chickens, and hams were meats that most participants thought of when considering the use of thermometers. While many participants could think of ways to use thermometers with thinner items, they all indicated that they would be unlikely to implement any of their ideas.

Cooking time also seemed to be a factor in this regard. Food items that required a longer cooking time were considered candidates for thermometer use, although again this did not guarantee that participants would use a thermometer on such foods.

Stove Cooking versus Oven — Food cooked in the oven were more likely to be considered for thermometer use than those cooked on the stove top. This reflects in part the lack of meat and poultry courses prepared on the stove top, although several participants discussed preparing a variety of meats on the stove. The idea of placing the thermometer in the oven, and then checking it periodically was stated often. Stove top cooking seemed closely associated with the hassle of using a thermometer and the thinness of the food that would be prepared there. Most participants, especially in the young adult groups, felt that these factors combined would assuredly keep them from ever using a meat thermometer. Using the built-in probe of a microwave oven as a thermometer was mentioned in all of the groups. This seemed to be considered less of a hassle than using a thermometer in a conventional oven.

Moist Food versus Dry — Participants strongly stated an association of dryness with safety, and moistness with “good cooking.” That is to say, most participants agreed that moist is to good cooking as dry is to safe cooking. They agreed that while something that had been cooked and remained moist might not be 100 percent safe to eat, it certainly would taste better than something that was overdone and dry. Nearly everyone in all groups was willing to trade safety for taste in such a case. Only the parents of young children stated that they would not take the risk for their children, although many said that they would for themselves.

Food Doneness versus Safety — Safety did not seem like a strong motivator for thermometer use in any group. With the exception of some of the young parent participants, nearly all participants in both cities felt that they had been cooking a certain way for many years and had never gotten sick in the past. They doubted the importance of changing their behaviors at this time. Nearly every participant discussed means other than temperature probes for determining the doneness of the meat and poultry that they cook.

Most participants, however, agreed that one strong selling point for encouraging people to make use of thermometers was to promote their use to *optimize* doneness. Participants agreed that if they felt assured that the use of thermometer would guarantee the optimal results of taste, texture and doneness, they would be more likely to use them. Safety (a more fundamental, lower-order need) was not considered as important as optimal taste (a higher order, more secondary or prestige-related need). The concept of safety was not considered “sexy,” while the guarantee of pleasing those that you cook for, your family and friends, was considered more important.

There was also concern as to relative safety and absolute safety. Most participants agreed that if they were careful about where they bought their meat and poultry products, and how they handled those products after purchasing them, then they would be safe “enough.” Trust of the butcher, the grocer, the chef, etc. constitutes relative safety and seemed to be the place where most participants were willing to place their trust. Nearly all participants felt that there was no absolute safety; that testing for doneness with a thermometer would not guarantee, for example, that the meat had not been previously tainted or spoiled. There was considerable discussion as to just where safety breakdowns can occur (i.e., at what part in the food delivery process [meat plant, shipping, grocery store, transporting it home, etc.]). With the exception of some young parent members, participants seemed content to trust in relative safety rather than alter behaviors to achieve absolute safety.

Cooking for Self versus Cooking for Others — Who prepares the food and for whom it is prepared was a factor in the use of food thermometers. Individuals who are preparing food solely for themselves or just one other person reported being less likely to consider using a thermometer. In both young adult groups, participants stated that they would be extremely unlikely to take any additional precautions, add additional steps to their cooking process, or change their cooking behaviors. These individuals emphasized minimizing time and effort in the cooking process. Most stated that since they were just cooking for themselves, they were willing to assume any risks (which they considered minimal) associated with not using a thermometer. Senior citizens, who have reentered a life stage where they no longer cook for many individuals on a daily basis, also stated that they would be unlikely to use thermometers for daily cooking. As parents, they prepared meals for the entire family, but in their current stage of life the empty nest syndrome likely reemphasizes time and convenience while simultaneously de-emphasizing safety.

Parents of young children reported being more likely to use thermometers to check on the safety and doneness of the food that they served to their children. Most who agreed that this would be an added step taken to protect their children admitted that they would be less likely to use the thermometer if they were cooking only for themselves.

Special Event Cooking versus Regular Cooking — The economies of cooking emerged as an important issue among participants in all groups in both cities. The likelihood of using a thermometer increased with such factors as the time and money invested in the meal preparation, the number of times a similar meal had been prepared in the past (therefore the previous investment of time and effort in that meal), and the prestige associated with serving a properly prepared meal. Special events, such as Christmas, Thanksgiving, and other holidays were reported as times when thermometers were most often used. In addition to holidays, thermometers were reported to be used when preparing special meals to entertain guests or when a meal was being prepared for the first time (so the cook had no experience

with preparing that meal). “Regular” cooking was not considered special enough to warrant any additional “effort” in the cooking process.

Folk Knowledge versus Scientific Knowledge — Participants in all groups in both cities believed that folk knowledge regarding proper cooking was more important and essential to them than was scientific findings or government recommendations. When asked what a convincing argument for thermometer use would be, many participants stated strong scientific proof as persuasive. However, none of the participants stated that strong scientific facts or proof regarding food safety messages had influenced their behaviors in the past. Further, clearly strong scientific evidence that the use of a thermometer diminishes the risk of contracting foodborne illnesses from meat and poultry exists, yet no one in any group stated that they actually changed their behavior based on existing evidence. Many participants stated that if strong evidence were presented in the mass media they would be more likely to pay attention to the message. However, none of the participants cited any scientific information or conclusive studies that had been presented in the past. The result is that while participants stated that they would be persuaded by scientific evidence, it is unlikely that such evidence will actually have a strong impact.

Folk knowledge, on the other hand, seemed to be the main source of information regarding food safety in the kitchen. Nearly every participant stated learning about proper food handling and preparation safety from their mother, grandmother, or other family member. Pulling the leg of a roasted chicken, cutting a steak open to check for doneness, using the sense of smell, going by past experience, and other methods of “ensuring” safety were cited as proper and adequate over “scientific proof.”

C. Recommendations

Several recommendations for next steps can be made based on the findings and discussion of those findings from these groups. They are detailed below:

- **Behavior Change is Possible** — Participants in both the young adult and the senior citizen groups in both cities stated that they would be very unlikely to change any behaviors regarding how they prepare the meat and poultry that they serve. Parents of young children indicated that they could be persuaded to change their behaviors if they felt that such changes would ensure the safety of their children. They indicated, however, that they would be unlikely to change behaviors solely for their own benefit.

While the clear message from participants was that they are unlikely to modify their behaviors to include the use of thermometers, experience has shown that individuals may be more likely to change than they explicitly state. Seat belts were mentioned in two groups as an example of a major behavioral modification that had little support when first introduced, but that has now become common place. In all groups the use of antimicrobial soaps for cleaning kitchen counter tops was mentioned, as was the use of multiple cutting boards for different food items. These behaviors were not standard kitchen procedures even a decade ago, yet now are considered standard practice. While participants strongly expressed their reluctance to alter their behaviors, this should not be taken as definitive information on the subject. There were encouraging signs of behavior change even from participants who stated that they would never change. 'If so and so were to happen, I would change,' indicates at least the willingness to consider change given the proper circumstances and motivations.

- **Target Parents of Young Children** — Of the three demographic groups considered, the parents of young children seemed most receptive to changing behaviors in the kitchen. Many of them expressed how they altered their behaviors in the past once their child had been born. Wiping down counter tops and preparing separate meals were mentioned as two modifications to previous behaviors that occurred following the birth of a child.

Targeting parents of young children has several benefits. These individuals expressed a willingness, and demonstrated the ability, to change behaviors in an effort to ensure the safety of their children. They expressed the feeling of increased responsibility for overall food safety, both to themselves and to those for whom they care. Targeting benefits for children may also have lasting impact beyond current food preparers, affecting change in food preparation behaviors for subsequent generations. As the participants in these groups stated, parents are the main source of food preparation and safety knowledge in the home, and the source of most peoples' information and enculturation on the subject. Parental use of thermometers in the home models this behavior to their children, thus impacting the next generation's use of the tool. Creating food safety messages in school curricula would ensure a consistent message for children both at home and in school. This reinforcement would enhance the likelihood that the message is learned, increasing the chance that the behavior will be adopted rather than be a temporary change due to heightened awareness.

- **Highlight Ordinary Meals, Not Special Events** — Participants indicated that thermometers are most often used during the preparation of meals at holidays or other special times. Reinforcement of the behavior during these times is not necessary, and

in fact may be counter-productive. Emphasizing the use of thermometers for daily preparation of meat and poultry introduces behavior change, and would be most effective at producing this change. Many participants stated that they could not visualize how a thermometer would be used on a pork chop, a hamburger, or a chicken breast. Demonstrating the ease of use of a thermometer with these food items would effectively model the desired practice, and potentially be more persuasive in producing behavior change. Stressing the ease with which a thermometer can be used to check food doneness cannot be underemphasized.

- **Emphasize Taste, Not Safety** — Participants in all groups agreed that they felt safe about the food they served in their own kitchens without using thermometers. Many participants stated that they would be more likely to use a thermometer if they were convinced that it would enhance the flavor and quality of the meal that they prepared. This belief would be more persuasive than if the message was one of safety alone. Using a thermometer to indicate the exact moment that food reaches the optimal temperature, or to avoid overcooking, was thought to be a persuasive message to encourage thermometer use. Cookbooks and other sources of cooking instructions offer an excellent media for encouraging thermometer use. Instructions for cooking to a certain proper temperature rather than for a specified length of time would be an effective way to promote the message.

APPENDIX A: MODERATOR'S GUIDE

APPENDIX B: TRANSCRIPTS
