

THE OKLAHOMA DUST BOWL: DIFFERENCES IN
HEALTH AND NUTRITION AMONG
OKLAHOMA RURAL OLDER ADULTS

By

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CHAPTER I

INTRODUCTION

Exposure to adverse events during childhood has a lingering effect into old age (Elder, 1999). Responding to a stressful situation can create advantage and disadvantage in health behaviors across the life course (Matthieu & Ivanoff, 2006; Wethington, 2005). Surviving traumatic experiences in childhood has been linked to chronic health problems in late and very late life (Blackwell, Hayward, & Crimmins, 2001). For instance, child survivors of natural disasters often experience diminished health functioning in late adulthood (Norris, et al., 1999; Smith, 1994; Tang, 2007). Diverse trajectories in health come to represent the consequence of early life experience (O’Rand, 1996). However, the extent to which early exposure to natural disasters create age, gender, and life event differences in health-related behaviors in later life remains unclear. This has implications relative to how adversity early in life creates health differences in late adulthood.

Life course theory is a framework that can help explain the association between past life experience and current health and nutrition in old age. Life course theory emphasizes the importance of when life events occur. In particular, Elder (1996) proposed that the life stage during which persons experience trauma influences age-associated outcomes. In other words, traumatic experiences during early life periods (e.g.,

childhood) are hypothesized to have lasting influences as persons reach advanced old age.

The Dust Bowl was a natural disaster that brought economic hardship to the rural Midwest from 1931 to 1939 (Cutler, Miller, & Norton, 2007). According to some historical accounts, this event impacted rural families well into the 1940's (Cutler et al., 2007). Although the aftermath of the Dust Bowl has largely been cited as an agricultural and socioeconomic disaster, it can be argued that this event has continued to influence the nutrition and health behaviors of those who experienced this event as a child.

Investigators have established that eating behaviors and food handling practices influenced by the distant past often compromise nutrition and health among older adults (Gettings & Kiernan, 2001). Older adults often make poor food handling choices that weaken immune functioning and increase vulnerability to foodborne illness. In addition, many older adults use sight alone to determine doneness of food, put hot food directly into the refrigerator, thaw frozen food in tap water that is never changed, and leave frozen meat on the countertop to thaw at room temperature (Buzby, 2002; Gettings & Kiernan, 2001; Gordon, Penner, Friel, Raacke, Boone, & Remig, 2004). These practices are believed to represent adaptive behaviors stemming from experiencing a traumatic event early in life (Gettings & Kiernan, 2001). Thus, it is important to clarify how age and gender may create differences among those who experienced the Dust Bowl event.

The focus of this study is to determine how those who experienced the Dust Bowl event differ from those who did not. The primary purpose of this study will be to distinguish age, gender, and event/non-event differences in nutritional status, food consumption, and food handling practices among older adults residing in rural Oklahoma.

CHAPTER II

REVIEW OF THE LITERATURE

Health behaviors are often learned in childhood (Gettings & Kiernan, 2001). Healthy aging evolves from childhood adversity. For instance, negative behaviors such as unhealthy food habits learned in childhood increase risk for nutritional deficits, foodborne illness, and poor health in late and very late life (Gorden, et al., 2004). This may be most salient among rural older adults. Many rural elders engage in unsafe food handling practices, as well as make unhealthy food choices (Arcury, Quandt, Bell, McDonald, & Vitolins, 1998). Among those residing in the rural Midwest, many older adults have aged in place and experienced traumatic natural disasters (e.g., tornadoes, flooding, drought) as children. Yet, it remains unclear how early exposure to natural disasters may create age and gender differences in health behaviors and nutrition outcomes. Investigators have noted that exposure to natural disaster that brings personal and financial loss produces detrimental health effects (Thompson, Norris, & Hanacek, 1993). For instance, older adults who experienced flooding disasters for multiple years in a row and then endured a tornado disaster also reported a decline in health practices (Phifer, 1990; Norris, Phifer, & Kaniasty, 1994). However, it is unclear how survivorship of a natural disaster creates age and gender differences in health and nutrition in late and very late life.

Rural Nutrition and Older Adults

Proper nutrition is often difficult for rural older adults to attain (Arcury, et al., 1998). Most rural older adults have competing living expenses, such as medication and medical bills which limit healthy lifestyle choices (Arcury et al., 1998; Wellman, Weddle, Kranz, & Brain, 1997). Such economic barriers can hinder healthy food purchases. Arcury et al. (1998) noted that healthier foods (e.g., fresh fruits and vegetables) are 20% to 25% more expensive than less nutritious food products. Furthermore, some rural older adults lack proximity to social (e.g., family, friends) and health (e.g., health clinics) resources. Social ties are vital to healthy food choices. However, most rural older adults do not want to be perceived as a burden to society (Hendy & Gordon, 1998). In effect, many older rural inhabitants fail to ask others for assistance in making appropriate food purchases, or seeking transportation to shop for food (Schoenberg, Coward, & Albrecht, 2001). As a result, the rural context presents barriers which limit access to health and nutrition resources.

Nutritional risk can be defined as those factors that can compromise nutritional status (Martin, Kayser-Jones, Stotts, Porter, and Froelicher, 2006). Approximately 80% of older adults who participate in the Elderly Nutrition Program are at nutritional risk (Kennedy, Ohls, Carlson, & Fleming, 1995). Another eight to sixteen percent do not have regular access to nutritionally appropriate foods (Kennedy et al., 1995). This suggests that many older adults do not maintain a nutritionally balanced diet which includes consumption of fruits, vegetables, and dairy products (Martin, et al., 2006). Nutritional risk is compounded by chronic disease, difficulty completing activities of daily living, and poor health status (Dutram, Cook, Bagnulo, and Lincoln, 2002). Taking three or

more drugs per day, having difficulty shopping, cooking, and eating (Quigley, Hermann, & Warde, 2006), and suffering from dental health problems that make it difficult to eat can further complicate nutrition and health in late adulthood (Martin, et al., 2006). It can be assumed, then, that food consumption, health behaviors, and health status are important components of nutritional well-being among rural older adults.

Furthermore, food handling practices are also linked to optimal health (Kendall, Medeiros, Hillers, Chen, & DiMascola, 2003). Older adults engage in food handling behaviors they learned in the past. These behaviors have often been self-taught, transmitted across multiple family generations, or gained by word of mouth (Gettings & Kiernan, 2001). This can result in a lack of knowledge relative to proper food preparation and storage (Gordon, et al., 2004). Gettings and Kiernan (2001) noted that the perceived financial cost of throwing food away and purchasing a food thermometer may be too great for some rural older adults. Therefore, some older adults forego safe food practices that could potentially limit the risk of foodborne illness. It is important that older adults receive safe food handling information in order to prevent illness and to promote proper nutrition habits.

Age and Gender Differences

Some researchers have suggested the existence of a “gendered life course” (Moen, 2001). Moen (2001) acknowledged that women are often subjected to conditions of “multiple jeopardy” (i.e., lower socioeconomic status, transition to poverty, role inequality). Older rural inhabitants tend to be widowed women who are physically frail, impoverished, and live alone (Rogers, 2002). Compared to men, older rural women typically experience greater nutritional health risks (Quandt & Chao, 2000; Ledikwe,

Smiciklas-Wright, Mitchell, Jensen, Friedmann, & Still, 2003). Although rural older men are more likely to engage in risky health practices, they typically co-reside with a spouse or other family member who provides assistance (Rogers, 2002). This is believed to provide protection against age-associated health problems (Rogers). Thus it can be hypothesized that older rural men will exhibit better health and nutritional well-being than older rural women.

Davis, Murphy, Neuhaus, Gee, and Quiroga (2000) have reported that elders who live with a family member have more favorable nutrition than those who live alone. Yet, this does not always equate into better health. Older adults who live with someone have better calorie and mineral intake. However, their fat and cholesterol have been reported to be higher than those who live alone (Green & Fitzhugh, 1993). Similarly, old-old women are more likely to participate in senior meal programs, but remain at high risk for nutritional deficits than male counterparts (Fey-Yensan, English, Ash, Wallace, & Museler, 2001). Many older women prefer to delay consumption of their meals, eat part of the meal, or save the rest to eat later. As a result, food is often left on the counter for long periods of time without being placed in a refrigerator or warmed in an oven (Roseman, 2007). Such food handling practices increase vulnerability to foodborne illness. Further investigation is needed to clarify evidence of age and gender differences in the food handling practices of rural older adults.

Conceptual Basis

Residing in a rural area over a long duration of time may increase cumulative disadvantage. Cumulative disadvantage is best defined as a successive addition of negative circumstances leading to diverging patterns or increased inequality over time

(Dannefer, 2003). In other words, the accumulation of several negative experiences can have a multiplication of detrimental effects. Compared to urban counterparts, rural inhabitants are more likely to be exposed to toxins and poor sanitation, work outdoors, suffer a work-related injury, and be challenged by limited access to social and economic resources (University of Pittsburgh Center for Rural Health Practice, 2004). Perhaps exposure to such risks has negative age-associated health effects across the life course. However, some rural inhabitants represent survivors who have managed to adapt to adverse circumstances.

The amassing of multiple hardships can translate into negative health consequences in late adulthood (Hatch, 2005). For example, the Dust Bowl was preceded by the Great Depression by only one year (Hurt, 1981). With the passing of the Great Depression, many American farm families experienced additional socio-economic setbacks as severe drought and wind erosion afflicted the Great Plains during the mid to late 1930's. As farm families recovered from economic hardships stemming from the Great Depression, they further endured a natural disaster that threatened their livelihood. Many children suffered from "Dust Pneumonia," a form of silicosis that filled the lungs with dust particles and made it difficult to breathe (Hurt). Despite the well documented traumas that were experienced by Oklahomans, it is unclear whether survivorship of a natural disaster event continues to influence health and nutrition differences early in life.

Life Course Theory

Life course theory (Elder, 1998) provides a theoretical framework for understanding how early life experiences influence age-associated outcomes in late and very late life. Elder (1996) proposed four key theoretical components relative to how

environments shape age-associated outcomes across the life course. First, individuals are embedded within and shaped by time and place. Healthy aging reflects when and where food choices were made (Devine, 2005). Second, age-related outcomes are contingent on the life period when events occur. In particular, childhood trauma is a determinant of health and well-being in later life (Krause, Shaw, & Cairney, 2004). Third, individuals possess a shared network of social ties. Eating behaviors and nutritional intake in later life is derived from social experiences (Devine, Connors, Bisogni, & Sobal, 1998; Wethington, 2005). Fourth, developmental outcomes reflect individual choices. Older adults who practice unsafe eating behaviors, such as eating eggs with runny yolks, report such behaviors as something they have always done without ever becoming ill (Gordon, et al., 2004). Thus, they continue to practice certain behaviors despite potential risk for foodborne illness (Gordon et al., 2004). Together, these dimensions highlight the relevance of how early experiences shape potential nutrition and health problems in older adulthood.

Research Question and Hypotheses

This investigation was an attempt to understand how experiences in childhood (e.g., natural disasters) create differences in health and nutrition behaviors. The following research question was proposed: Does the experience of a natural disaster during childhood influence nutritional status, food handling practices, and health outcomes in late and very late life? First, it is hypothesized that perceived health status, functional status and health impairments will emerge as vulnerable variables, whereas nutritional status and food consumption will represent strengths across the sample. Second, it is hypothesized that poor perceived health status, poor functional status, and greater health

impairments will be associated with poor nutritional status and poor food handling behaviors. Third, it is surmised that gender and event/non-event differences will emerge in perceived health, functional status, health impairments, and nutritional status. Fourth, it is hypothesized that those who experienced the Dust Bowl event as children will be at greater risk for unsafe food handling practices. This is believed to increase the likelihood that old-old women will be at greater risk for poor nutrition than older men who experience greater food handling vulnerabilities.

CHAPTER III

METHODS

Sample

A convenience sample of N = 171 older community-dwelling men and women residing in rural Oklahoma participated in this study. Sample selection was restricted to participants who were age 65 and divided into two age categories: old (65-79), and oldest-old (80+). This categorical division has been an acceptable methodological approach in past aging studies (Neugarten, 1974; Suzman, Willis, & Manton, 1992). Participant recruitment met two definitions of “rural.” First, sampling took place in Oklahoma counties designated as “non-metro” by the U.S. Office of Management and Budget Metropolitan Statistical Areas (2005). Second, participants were required to reside within communities of 2500 persons or less. This conformed to the U.S. Census Bureau definition of “rural.”

Recruitment and Data Collection

Convenience sampling was used to recruit participants. For this study, participants were identified through Oklahoma State University County Extension Educators, as well as through community and county nutrition service sites and senior activity centers. Data collection involved group surveys and individual interviews. All participants were required to complete the Short-Portable Mini-Mental Status Questionnaire (SPMSQ; Pfeiffer, 1979). The SPMSQ is a brief, 10-item cognitive screening interview that

assesses short- and long-term recall of information. This was used to identify persons who required assistance (e.g., reading, writing, comprehension) completing the survey process. According to Pfeiffer (1979), a cut-off score of greater than four errors indicates cognitive impairments. Data from participants who made greater than three errors on the screening were excluded from final analyses of this study. In addition, all participants received monetary compensation of twenty dollars for completing the survey.

Measures

Socio-demographics. Participants were asked to provide socio-demographic information. Participants were asked to indicate their current age, gender, race, marital status, education, and income.

Life Event Experiences. The 1930's Dust Bowl served as the key life event of interest. Participants were asked to indicate if they had or had not experienced the 1930's Dust Bowl. Responses were coded as 0 = No and 1 = Yes. Participants who responded positively were then asked to indicate their age when they experienced the event. For purposes of this study, participants who indicated that they were 18 years of age or younger were designated as experiencing the event as a child. This age designation was used to differentiate childhood life events from experiences which occur beyond childhood. Investigators have acknowledged an association between adverse historical events during childhood and developmental outcomes in later life (Elder, 1999). Therefore, participant responses were adjusted and recoded based on reported age when the event occurred. In particular, responses were recoded as 1 = Event occurrence at age 18 or younger and 0 = Event occurrence at age 19 or older.

Nutritional Health Status. The Mini Nutritional Assessment (MNA-SF; Rubenstein, Harker, Salva, Guigoz, & Vellas, 2001) served as the measure of nutritional status. Scores on the MNA-SF are highly correlated with the original full version ($r = .94$). The short-form assesses Body Mass Index calculated using height and weight (weight/height^2) in kg/m^2 . For this study, BMI was calculated based on CDC standards (CDC – Adult BMI Calculator, 2008). From those standards, BMI was coded to adhere to MNA-SF standards, where 0 = BMI less than 19, 1 = BMI 19 – 20, 2 = BMI 21 – 22, and 3 = BMI 23 or greater. Additional single-item self-report information relative to a decline in food intake, weight loss over the past three months, mobility impairment, psychological distress, and neuropsychological problems was also evaluated. It is important to note that a more objective assessment of neuropsychological problems. In particular, self-report responses reflecting neuropsychological problems were adjusted based on participants SPMSQ scores. This was accomplished to include a more accurate and less subjective assessment of neuropsychological impairment. There is a maximum score of 14 on the MNA-SF. A score of 12 or greater indicates normal nutritional standing, whereas a score of 11 or below indicates possible malnutrition.

Food Consumption. Food consumption was assessed using eight single item indicators. Participants were asked to provide a self-report answer relative to the amount of servings of fruits, vegetables, potatoes, dairy, breads, legumes, and meat they consumed each day. Participant responses were coded as 0 = None, 1 = 1 cup or less, 2 = 2-3 cups, and 3 = More than 3 cups.

Food Handling. Food handling behaviors were assessed using dichotomous (0 = No, 1 = Yes) questions devised by professionals in nutrition. Respondents were asked to indicate

whether they typically engage in food handling practices including storing leftover food (e.g., “Do you save part of your food to eat at another time?”), determining safety to eat food (e.g., “Do you look for signs of spoilage such as mold or a bad smell?”), and preparation of leftover food (e.g., “Do you heat leftover food to 165 degrees using a food thermometer to check the temperature?”).

Subjective Health Status. Subjective health was assessed using the Subjective Health Perceptions Scale from the Duke Older Americans Resources and Services Procedures (OARS; Fillenbaum, 1988). An example item includes, “How would you rate your overall health at the present time?” Participants were asked to rate each question on a 4-point scale, where 1 = Poor, 2 = Fair, 3 = Good, and 4 = Excellent. Reported cronbach’s alpha for this measure is high ($\alpha = .74$).

Functional Health. Functional capacity was assessed using the Self-Care Capacity (ADL) Scales of the OARS (Fillenbaum, 1988). These items assess the difficulty persons have completing instrumental (i.e., shopping, cooking, and cleaning) and physical (i.e., bathing, dressing, eating, and using the toilet) tasks. Participants were asked to rate their abilities on a scale of 1 to 3, where 1 = Completely Unable, 2 = With some help, and 3 = Without help. Both the instrumental and physical items of the scale have a reported high reliability with alpha coefficients of $\alpha = .87$ and $\alpha = .84$ respectively.

Health Impairment. Health impairment was assessed using a checklist of 43 health conditions (e.g., cardiovascular, respiratory, cancer, diabetes, etc.). Respondents were asked to indicate whether they have experienced any of the listed health problems during the past 12 months. Conditions that are checked were summarized into a cumulative

score of impairment. Higher scores indicated a greater degree of health impairment, whereas a lower score represented a lower degree of health impairment.

Analysis

SPSS version 14.0 was used to analyze the data. Four separate analyses were computed to help answer the four hypotheses of the study (Table 1). First, descriptive

Table 1

Hypotheses, Variables of Interest, and Analyses

Hypothesis	Outcome Variables	Analysis
1. Physical, functional and perceived health will emerge as evident vulnerabilities of the sample	Perceived Health Status Functional Health Status Health Impairment Nutritional Status Food Consumption	Frequencies, Means, Standard Deviations
2. Poor health and nutritional health status will be associated with improper food handling behaviors	Subjective Health Status Functional Health Status Health Impairments Nutritional Status Food Consumption Food Storage Food Safety Food Preparation	Correlations
3. Gender and life event differences will exist in subjective health status, functional capacity, health impairments, and nutritional status	Subjective Health Status Functional Health Status Health Impairments Nutritional Health Status Food Consumption	ANOVA
4. Experiencing a natural disaster in childhood will increase the likelihood of engaging in improper food handling practices among men and women in late and very late life	Food Storage Food Safety Food Preparation	Logistic Regression

statistics, in particular, frequencies, means, and standard deviations of all study variables were assessed. Second, bi-variate correlations of all outcomes variables were assessed. This was achieved in order to understand positive and negative associations between study variables. Third, an assessment of a 2 (gender) x 2 (event /non-event) Analysis of Variance (ANOVA) was computed. ANOVA analyses were computed to determine significant gender and event/non-event differences in nutritional and health outcomes. It should be noted that age was not assessed in the ANOVA analyses due to the near absence of young-old men who experienced the Dust Bowl. Fourth, separate multiple logistic regression analyses were computed for dichotomous questions representing food handling practices. This was accomplished to understand how age, gender, and a natural disaster experience influence food handling behaviors.

CHAPTER IV

RESULTS

Socio-demographic Results

Demographic information was collected for the purpose of understanding the sample participants (Table 2). One hundred seventy-one older men and women residing in rural Oklahoma ($n = 120$ women and $n = 51$ men; $M = 77.46$ years, $SD = 8.24$) participated in the study (see Table 2). Participants were relatively homogenous. For example, 98% of participants reported their ethnicity as White/Caucasian. The remaining 2% of participants reported their ethnicity as Hispanic/Latino or Asian-American. In addition, 91.6% of the sample indicated they were currently married or widowed, 49.7% and 41.9% respectively. A remaining 5.4% of participants reported being divorced, 1.2% indicated being separated, and another 1.8% acknowledged they had never married.

Educational achievement was also considered. In particular, 41.8% indicated they received a high school diploma or GED equivalent. Another 25.3% completed some college or had received a college degree, whereas 14.1% reported completion of some post-graduate education. Finally, 17% acknowledged they had less than a high school education, and a remaining 1.8% of participants indicated they had completed vocational education or technical training.

Table 2

Summary of Frequencies, Means, and Standard Deviations of Demographic Variables

Variable	Frequency	Percentage	Mean	Standard Deviation
Gender				
Male	51	29.8		
Female	120	70.2		
Age			77.46	8.24
Race				
White Caucasian	169	98.8		
Hispanic/Latino	1	0.6		
Asian-American	1	0.6		
Marital Status				
Never Married	3	1.8		
Married	83	49.7		
Widowed	70	41.9		
Divorced	9	5.4		
Separated	2	1.2		
Education				
Vocational/Training	3	1.8		
Grade School	5	2.9		
Junior High	4	2.4		

(table continues)

Table 2 continued

<i>Variable</i>	<i>Frequency</i>	<i>Percentage</i>	<i>Mean</i>	<i>Standard Deviation</i>
Some High School	20	11.7		
High School Diploma	71	41.8		
Some College	31	18.2		
College Degree	12	7.1		
Some Post Graduate	17	10.0		
Master's Degree	7	4.1		
Total Years of Education			12.99	2.44
Dust Bowl Experience				
Event	110	65.1		
Non-Event	59	34.9		

Finally, participants were also asked about childhood life experiences. In particular, participants were asked to indicate whether they had experienced the Oklahoma Dust Bowl of the 1930's as a child (e.g. 18 years of age or under). Sixty-five percent of participants reported that they had experienced the Dust Bowl. The remaining 35% indicated that they had not experienced the Dust Bowl. Thus, a majority of participants who were 18 years of age or under lived during the Dust Bowl.

Strengths and vulnerabilities in health and nutrition outcomes were also considered. In particular, mean scores reflecting nutritional status, food consumption, functional health, health impairment, and perceived health were analyzed across the

sample. Health impairment ($M = 3.51, SD = 2.27$) and perceived health ($M = 9.75, SD = 2.11$) emerged as vulnerable health outcomes, whereas nutritional status ($M = 12.09, SD = 1.47$), food consumption ($M = 9.35, SD = 2.24$), and functional health ($M = 38.37, SD = 1.14$) appeared to represent strengths across the sample (Table 3). In other words, the sample had high average scores reflecting health impairment but lower average scores on subjective health status. However, participants averaged higher scores relative to nutritional status, food consumption, and functional health.

Table 3

Vulnerabilities and Strengths of Outcome Variables

Variables	Range	Median	Mean	Standard Deviation
Nutritional Status	8-14	12.00	12.09	1.47
Food Consumption	0-18	9.00	9.35	2.24
Functional Health	13-39	39.00	38.37	1.14
Health Impairments	0-13	3.00	3.51	2.27
Perceived Health	4-14	10.00	9.75	2.11

Bi-variate Correlations

Bi-variate correlations were calculated to further explore associations between nutrition and health variables (Table 4). Significant correlations among these study variables ranged from .20 to .35. In addition, bi-variate correlations between health outcomes, nutrition, and food handling behaviors ranged from .15 to .35. No significant

correlations emerged between nutritional health status and health variables used in the study.

Relative to health outcomes, fewer health impairments were associated with greater functional health ($r = -.20, p < .01$), whereas greater subjective health status was related to better functional health ($r = .33, p < .01$) and fewer health impairments ($r = -.35, p < .01$). Associations also existed between subjective health status, health status, and food handling practices. For example, better subjective health status was associated with greater risky food safety practices such as tasting food before eating it ($r = .19, p < .05$), whereas better subjective health was negatively associated with using a microwave to reheat food ($r = -.27, p < .01$). Furthermore, greater health impairment was associated with greater checking of food for signs of spoilage ($r = .15, p < .05$).

Several associations between nutritional health status and food handling practices were suggestive of improper or risky food behavior. In particular, better nutritional health status was negatively associated with not marking the date when storing leftover food ($r = -.25, p < .01$) as well as not checking for signs of spoilage ($r = -.18, p < .05$). In other words, better nutritional health appears to influence whether rural older adults properly store or handle leftover food.

In addition, several bi-variate associations emerged across food handling variables. For instance, saving food ($r = .15, p < .05$) was positively associated with storing food, whereas using foil or plastic wrap ($r = -.17, p < .05$) was negatively associated with storing food. This suggests that the more that is saved, the more it is stored in containers from which the food originated. It is plausible to assume that this may no longer remain true in the event foil or plastic wrap is used.

It is important to note that five key associations among food handling variables were indicative of precautionary behaviors. First, using a thermometer to check reheated food was associated with heating leftover food to a boil ($r = .19, p < .05$). Second, storing food that originally had margarine on it was positively associated with using foil or plastic wrap to store food ($r = .23, p < .01$). Third, saving food ($r = .25, p < .01$), using foil or plastic wrap ($r = .22, p < .01$), and marking the date ($r = .17, p < .05$) were all positively associated with checking for signs of spoilage. Fourth, checking the date of storage ($r = -.19, p < .05$) was negatively associated with eating leftover food cold. Fifth, marking the date of storage ($r = .29, p < .01$) and checking for signs of spoilage ($r = .33, p < .01$) were positively associated with checking the date of storage on leftover food. Thus, rural older adults do engage in greater food handling precautions including thermometer use when boiling leftover food, use of foil and plastic wrap when storing food, and checking for signs of spoilage when saving food, using foil or plastic wrap, and marking the date of storage.

Yet, several significant associations were suggestive of improper food handling. Storing leftover food ($r = .16, p < .05$), storing food in containers that originally had margarine on it ($r = .22, p < .01$), and checking for signs of spoilage ($r = .18, p < .05$) were positively associated with tasting leftover food to determine whether it is still safe to eat. Furthermore, storing leftover food ($r = .28, p < .01$) and tasting leftover food to determine whether it was still safe to eat ($r = .20, p < .05$) were positively associated with eating leftover food cold. In effect, storing leftover food may influence poor food safety behaviors among rural older adults.

Table 4

Correlation Matrix of Outcome Measures

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Nutrition	1																
2. Food	.03	1															
3. ADL's	.13	.05	1														
4. Impairment	-.12	-.09	-.20**	1													
5. Health Status	.15	.14	.33**	-.35**	1												
6. Save	-.16	.02	-.02	.03	-.05	1											
7. Store	.03	-.07	-.08	-.07	-.03	.15*	1										
8. Foil/Plastic	-.02	-.01	-.13	.08	.13	.07	-.17*	1									
9. Margarine	-.14	.02	-.09	.09	-.05	.12	.04	.23**	1								
10. Mark Date	-.25**	-.07	-.10	.00	-.14	.02	.04	.08	-.02	1							
11. Spoilage	-.18*	-.01	-.00	.15*	-.01	.25**	-.08	.22**	.12	.17*	1						
12. Taste	-.03	-.09	.06	-.14	.19*	.11	.16*	.09	.22**	.05	.18*	1					
13. Check Date	-.11	.01	-.11	.02	-.03	.00	-.06	-.01	.06	.29**	.33**	.12	1				
14. Leftovers	.03	-.00	.03	.07	.06	.07	.28**	.00	.01	-.02	.01	.20*	-.19*	1			

(table continues)

Table 4 continued

Measure	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
15. Microwave	.07	.00	-.09	.15	-.27**	.06	-.05	-.10	.05	-.12	.13	-.02	.07	.02	1		
16. Boil	-.09	-.02	-.02	.03	.04	-.07	.01	-.06	-.04	.06	.08	-.07	.12	.02	.09	1	
17. Thermometer	.00	-.10	.06	.13	-.08	-.14	.04	-.03	-.02	.09	-.00	.12	.00	.04	.09	.19*	1

* $p < .05$ ** $p < .01$

Analyses of Variance Results

Analyses of Variance (ANOVAs) consisting of a 2 (Gender) X 2 (Event/Non-Event Dust Bowl Experience) were computed to assess gender and life event differences in health outcomes. Only one significant gender difference emerged (Table 5). A significant difference was evident for nutritional status, $F(1, 152) = 4.68, p < .05$. In particular, older men had greater average nutritional health status scores than women.

Table 5

Mean Gender Differences in Health Outcomes

Health Measures	<i>M</i>		<i>F</i>	<i>p</i>	η^2
	(Men)	(Women)			
Scale (Low – High)	(<i>n</i> = 50)	(<i>n</i> = 117)			
Nutritional Status	12.52	11.96	4.68	.03*	.03
Food Consumption	9.92	9.18	3.10	.08	.02
Functional Health	38.32	38.46	0.50	.47	.00
Health Impairments	3.09	3.55	1.34	.24	.00
Perceived Health	9.85	9.78	0.03	.85	.00

* $p < .05$

Health outcomes of participants who experienced or did not experience the 1930's Dust Bowl during childhood were also considered (Table 6). Only one significant life event difference emerged. In particular, a significant difference was evident for functional health, $F(1, 164) = 3.66, p < .05$. In other words, participants who had

experienced the 1930's Dust Bowl as children reported lower average functional health status than those who did not experience the event.

Table 6

Mean Event/Non-Event Differences in Health Outcomes

Health Measures	<i>M</i>		<i>F</i>	<i>p</i>	η^2
	(Event)	(Non-Event)			
Scale (Low – High)	(<i>n</i> = 109)	(<i>n</i> = 58)			
Nutritional Status	12.02	12.46	2.80	.09	.00
Food Consumption	9.22	9.87	2.42	.12	.00
Functional Health	38.20	38.58	3.66	.05*	.00
Health Impairments	3.67	2.97	3.15	.07 ⁺	.00
Perceived Health	9.58	10.05	1.58	.21	.01

* $p < .05$ ⁺ $p < .10$

Logistic Regression Results

In order to evaluate how gender, age, and a childhood life event predicts food handling practices, binary logistic regression analyses were computed. First, food storage behaviors were considered (Table 7). Older women were .41 times less likely (odds ratio (OR) = .41, 95% confidence interval (CI) = .18-0.90) than older men to report using foil or plastic wrap to store leftover food. In particular, 92% of older men reported having practiced this behavior, whereas as 81% of older women indicated such preference. Women were also .45 times less likely (OR = .45, 95% CI = .21-0.95) to mark the date of storage on leftover food. Forty-seven percent of older men reported engaging in this

behavior, compared to 29% of older women. In addition, old-old adults (80+ years) were .25 times less likely (OR = .25, 95% CI = .09-0.67) than young-old adults (65-79 years) to use foil or plastic in storing leftover food. Specifically, 92% of young-old adults reported using foil or plastic wrap when storing food, whereas 73% of old-old adults indicated they engaged in such practice. Experiencing the Dust Bowl as a child did not significantly increase the likelihood of engaging or not engaging in food storage practices.

Second, the determination of whether food is safe to eat was examined (Table 8). Older women were 2.46 times more likely (OR = 2.46, 95% CI = 1.21-5.01) than older men to taste leftover food. Forty-five percent of older men reported engagement in this behavior, compared to 66% of older women. Older women were also .45 times less likely (OR = .45, 95% CI = .20-1.01) than older men to check dates on leftover food before consumption. Ninety-nine percent of older men reported they check storage dates before consuming leftover food, whereas 81% of older women reported doing the same. Furthermore, old-old adults were .48 times less likely (OR = .48, 95% CI = .23-1.01) than their younger counterparts to taste leftover food before consuming it (28% v. 45% respectively). Similarly, old-old adult adults were .35 times less likely (OR = .35, 95% CI = .13-0.93) than young-old adults to check storage dates on leftover food before consumption. Ninety-one percent of young-old adults reported they check the storage date on leftover food, compared to 78% of old-old participants. Experiencing the 1930's Dust Bowl as a child did not significantly increase the likelihood of engaging in or not engaging in food safety determination.

Table 7

Logistic Regression Analysis Predicting Food Storage Behavior

Variable	Save Food		Store Food		Foil/Plastic		Margarine		Mark Date	
	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR
Gender	.13(.46)	1.13	.62(.37)	1.85	-.89*(.40)	0.41	-.19(.34)	0.82	-.79*(.38)	0.45
Age	-.91(.50)	0.40	-.66(.38)	0.51	-1.36**(.49)	0.25	-.51(.34)	0.59	-.40(.36)	0.66
Event/Non-Event	.09(.04)	1.10	-.22(.41)	0.80	.29(.43)	1.34	-.01(.35)	0.98	.10(.37)	1.11

* $p < .05$ ** $p < .01$

Table 8

Logistic Regression Analysis Predicting Food Safety Behavior

Variable	Spoilage		Taste Food		Check Dates	
	β (SE)	OR	β (SE)	OR	β (SE)	OR
Gender	-.84 ⁺ (.48)	0.42	.90*(.36)	2.46	-.79*(.41)	0.45
Age	-.83(.58)	0.43	-.72*(.37)	0.48	-1.04*(.49)	0.35
Event/Non-Event	-.02(.52)	0.97	.09(.38)	1.09	-.13(.43)	0.87

* $p < .05$ ⁺ $p < .10$

Finally, gender, age, and childhood life event experiences as predictors of food preparation were evaluated (Table 9). Older women were .39 times less likely (OR = .39, 95% CI = .19-0.80) than older men to reheat leftover food to boiling. Seventy-two percent of older male participants reported engagement in this practice, whereas 51% of older women reported they reheat leftover food to boiling. In addition, older adults who experienced the Oklahoma Dust Bowl in the 1930's as children were 3.16 times more likely (OR = 3.16, 95% CI = 1.14-8.80) than those who did not experienced this event to use a thermometer when reheating food. Nineteen percent of participants who experienced the event as children reported engagement in this behavior, compared to 7% of those who never experienced the Dust Bowl.

Table 9

Logistic Regression Analysis Predicting Food Preparation Behavior

Variable	Leftovers		Microwave		Boiling		Thermometer	
	β (SE)	OR	β (SE)	OR	β (SE)	OR	β (SE)	OR
Gender	.56(.38)	1.75	.03(.52)	1.03	-.92*(.35)	0.39	.45(.48)	1.57
Age	-.00(.41)	0.99	.23(.51)	1.27	-.33(.38)	0.71	.16(.57)	1.17
Event/Non-Event	.04(.42)	1.04	.18(.56)	1.20	.30(.38)	1.36	1.15*(.52)	3.16

* $p < .05$

CHAPTER V

DISCUSSION

Results from this study confirmed that health status resonates as a source of vulnerability, as well as strength, among older rural populations. In particular, older adults residing in rural settings are challenged by various health impairments and poor subjective health. Rural older adults are more likely than their urban counterparts to experience diminished health functioning (Probst, Samuels, Moore, & Gdovin, 2002). Physical capacity and functional ability are necessary in the maintenance of health status among older adults (Lindgren, Svärdsudd, & Tibblin, 1994). Compromised health status in late adulthood is often predictive of mortality (Lee, 2000). However, results from this study indicate that robust nutrition and health among rural older adults may depend upon three conditions: 1) Gender of the older adult 2) Adverse natural event experienced during childhood 3) Food handling practices and storage of leftover food.

Gender

Gender is a key determinant of health functioning in late and very late life (Norris Perilla, Riad, Kaniasty, and Lavizzo, 1999; Tang, 2007). As men and women age, they experience greater social and physical detriments (Backes, Amrhein, Lasch, & Reimann, 2006). However, women may face greater challenges evolving from disadvantage. Moen (2001) argued for the existence of a “gendered life course.” In other words, women experience numerous social inequalities (e.g., limited educational opportunities, lack of employment compensation, greater likelihood of poverty) across the life course compared

to men. These experiences create “multiple jeopardy” (e.g., being old and a woman) which compromise health and well-being that can result in a disadvantaged state of health (Moen). Results from this study appear to support this concept. In particular, older men appeared to have a more robust nutritional health status than their female counterparts. Investigators have noted that older rural women are at a greater risk for malnutrition than their male counterparts (Quandt & Chao, 2000; Rogers, 2002). Consistent with other studies, old-old women, especially those compromised by physical frailty, tend to be at greatest risk for nutritional deficits (Sharkey & Branch, 2004; Ledikwe, Smiciklas-Wright, Mitchell, Jensen, Friedmann, & Still, 2003). Thus older rural women may have a greater need for comprehensive nutritional education and programs that enhance nutritional health status and quality of life.

Adverse Life Events

It is important to note that older adults who experienced the 1930’s Dust Bowl as children reported a lower functional health status. Childhood events have been acknowledged to have negative effects that ultimately compromise functional abilities in late and very late life (Pinto, 2007; Wickrama, Conger, & Abraham, 2005; Krause, Shaw, & Cairney, 2004). This may stem from a lack of social resources in rural communities (family, friends, health and nutrition programs) that influence optimal health in later life (Glasgow, 1993). Rural older adults who are able to access social and community resources have been acknowledged to achieve a higher survival rate into late adulthood (McCulloch & Kivett, 1995). It is plausible that social and economic devastation stemming from the Great Dust Bowl has had a lingering influence upon contemporary

life. This may be especially true among older adults residing in rural communities which never fully recovered.

Nutrition, Health, and Food Handling Behaviors

Although adversity stemming from gender and childhood experiences represent plausible explanations for health status deficiencies in late and very late life, improper food handling practices may represent an alternative explanation for why older adults residing in rural settings experience poor health and nutrition. Food safety has been reported as a key indicator of proper health functioning (Kendall, Hillers, & Medeiros, 2006; Buzby, 2002). One of the primary goals of this investigation was to determine how adversity during childhood (e.g. the Dust Bowl) influences food handling practices among rural older adults.

The manner in which older adults handle food is largely determined by age, gender, and past life experience (Gettings & Kiernan, 2001; Devine, 2005). Improper food handling has been reported to increase incidence of debilitating diseases including E-coli, *Salmonella*, and *Listeria* (McCabe-Sellers & Beattie, 2004). Such illnesses can further compromise the health of older adults to the point of early mortality (Buzby, 2002; Kendall, Medeiros, Hillers, Chen, & DiMascola, 2003). It was originally hypothesized that poor health and nutrition would be associated with risky food handling behaviors among the rural older adults. However, this hypothesis was not fully supported. Although better nutritional health was associated with improper food handling practices, better nutritional health may influence food handling practices which can diminish health. Greater health impairment and poor subjective health status were associated with greater

precaution in handling leftover food. However, poor health status may influence health through improved adherence to precautionary food handling practices.

Therefore, it appears that old-old adults are most at risk for mishandling food. Old-old adults typically engage in unsafe food storage behaviors (Roseman, 2007). Older rural women in the present study were more likely to engage in unsafe food handling practices than their male counterparts. This was a counterintuitive finding. Older rural men are often reported to engage in poor food handling behaviors (Altekruse, Yang, Timbo, & Angulo, 1999). This contradiction suggests that older men may engage in unsafe food handling practices, however, this does not necessarily equate into poor nutritional health. Perhaps, old-old women may be at most risk for improper food handling practices because they are more likely to save food. This is especially true among those who participate in senior nutrition programs in rural communities (Fey-Yensan, English, Ash, Wallace, & Museler, 2001). Further investigation is needed to clarify how nutrition programs may establish safety or risk in food handling.

Based on the present study, it can be argued that old-old women are more likely to save leftover food more and continue to rely on unsafe food storage practices. This may stem from past experiences that were learned from the family of origin (Gettings & Kiernan, 2001; Devine, Connors, Bisogni, & Sobal, 1998). Past experiences may explain why deleterious food behaviors persist over time. However, it remains unclear how early food handling influences are shaped and continued across the life course.

Perhaps the food handling practices of old-old adults within this study reflect a cohort effect. The fact that many participants were children during the 1930's Dust Bowl may help explain likelihood of using a thermometer during food preparation. This may

represent an adaptive behavior. In other words, the Dust Bowl may have created an urgency to salvage food during a period of economic uncertainty and food scarcity (Egan, 2006). This may have resulted in a cautionary food attitude among those who were children during the Dust Bowl. In effect, use of a food thermometer may be perceived as a food storage option and technology that provides a sense of food security.

Study Limitations

Although several significant findings relevant to nutrition and health status among rural older adults emerged, several limitations persisted. First, the study relied upon a convenience sample of older rural adults. This produced a highly homogenous sample comprised primarily of white older females. Therefore, results may not generalize to the general population. The use of a random or population based sampling procedure would have produced a more heterogeneous sample. Second, the sample for this study was targeted at rural older adults in one Southern state. There was no comparison group used to assess group differences. Therefore the interpretation and application of results may be limited to older persons who reside in rural environments. The addition of an urban comparison group may have increased diversity or heterogeneity among the sample. Third, the cross-sectional nature of this study limited interpretation of longitudinal inferences and causal relationships. A longitudinal study would have improved insights relative to causation or association among variable outcomes. Fourth, it should be noted that there was a limited number of men in the sample who did not experience the Dust Bowl as a child. This may have compromised the robustness of findings relative to gender. In particular, age was excluded from the ANOVA analysis due to the near-absence of men in the younger age category.

Implications and Future Directions

Despite limitations, findings from this study have implications for rural professionals and practitioners alike. This information may be most useful for geriatric service providers, rural health professionals, and county extension agents. In particular, rural health professionals should use results from this investigation to provide sufficient education programs that help reduce the risk of poor health, enhance food handling behaviors, and improve quality of life. Researchers have indicated that food safety awareness and behaviors can be enhanced by disseminating educational resource packets to homebound elders and senior nutrition sites (Foote, Clark, Clutter, Crusey, Holmes, Johnson, et al., 2000). This provides evidence that unsafe food handling behaviors can be altered to enhance healthier lifestyle behaviors and outcomes.

Future research on food safety and older adult populations should focus on mechanisms associated with food handling behaviors in later life. Analyses should include in-depth qualitative interviewing to better understand past and present food handling behaviors of older adult populations, development of a standardized and reliable food safety survey instrument which assesses potential risk for poor health outcomes, and intervention studies to determine effectiveness of educational programming on food safety targeted at older populations.

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VITA

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Education: Graduate of Union High School, Tulsa, OK in May 2002; received Bachelor of Science with Summa Cum Laude Honors from Oklahoma State University in Human Environmental Sciences with a major in Human Development and Family Science in July 2006; completed the requirements for the Master of Science degree at Oklahoma State University with a major in Gerontology, in July 2008.

Experience: Employed as an Advantage Case Manager, LIFE Senior Services, Inc., 2008 – present; Research Assistant, Oklahoma State University Department of Human Development and Family Science, 2006 – present; Medicare Specialist Intern, LIFE Senior Services, 2006.

Professional Memberships: Oklahoma Council on Family Relations, Gerontological Society of America, Phi Kappa Phi Honor Society, Kappa Omicron Nu Honor Society, Golden Key Honor Society.

ABSTRACT

Name: Sara Anne DeStefano

Date of Degree: July, 2008

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: THE OKLAHOMA DUST BOWL: DIFFERENCES IN HEALTH
AND NUTRITION AMONG OKLAHOMA RURAL OLDER ADULTS

Pages in Study: 45

Candidate for the Degree of Master of Science

Major Field: Gerontology

Scope and Method of Study: The purpose of this investigation was to determine how gender, age, and life event experience influence differences in health outcomes among older rural adults. Specifically, nutrition, health, and food handling practices were examined through correlations, mean differences (2 gender X 2 life event), and logistic regression analyses. Participants included $N = 171$ persons age 65 and older who currently resided in five rural communities in Oklahoma. Data was collected using surveys consisting of eight instruments that assessed socio-demographic information, life event experience, nutritional health status, food consumption, food handling, subjective health status, functional health status, and health impairment.

Findings and Conclusion: This study revealed that health and nutrition appear to influence precautionary as well as risky food handling practices. Furthermore, older adults who experienced a natural disaster as a child have greater functional health problems in later life. Finally, women and old-old adults residing in rural settings appear to be most at risk for poor nutrition and health, as well as engagement in improper food handling practices.

ADVISOR'S APPROVAL: _____
Dr. Alex Bishop