

## FINAL PROGRESS REPORT

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## List of Abbreviations

APIM	Actor-Partner Interdependence Model
CATI	Computer Assisted Telephone Interview
CDC	Center for Disease Control
CES-D	Center for Epidemiologic Studies Depression Scale
CVD	Cardiovascular Diseases
FETRA	Fair and Equitable Tobacco Reform Act
FHADES	Farm Household and Demographic Enumeration Survey
FHIS	Farm Family Health Interview Survey
IRB	Institutional Review Board
JHAC12	John Henry Active Coping Scale
JHS	John Henry Scale
KFFHHSP	Kentucky Farm Family Health and Hazard Surveillance Project
NAGCAT	North American Guidelines for Children's Agricultural Tasks
NASS	National Agriculture Statistics Service
NE-177	National Dairy Study
NHIS	National Health Interview Survey
NIOSH	National Institute of Occupation Safety and Health
OR	Odds Ratio
PI	Principal Investigator
RIS	Retirement Identification Scale
SAS	Statistical Analysis System
SCASS	South Carolina Agricultural Statistics Service
SC-FHADES	South Carolina Farm Household and Demographic Enumeration Survey
SRC	Survey Research Center
UK	University of Kentucky
UKSRC	University of Kentucky Survey Research Center
U.S.	United States
USDA	United States Department of Agriculture
USDHHS	United States Department of Health and Human Services

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## Abstract

Agriculture boasts the oldest average age worker of any occupation in the United States. The latest Census data reports the average age of the American farmer as 55.3 years and this is expected to increase until mid-century. Over one quarter of the two million plus U.S. farms are operated by persons over age 65. Nearly half of all farms list a second operator, most often in the same generation, thus the number of older farmers is even greater than previously thought. This six year study of farmers over age 50 describes the health and injury status, work and work organization, cultural values, and dimensions of work related decisions of 1,423 older farmers who reside in Kentucky and South Carolina. It includes data from two groups of farmers often missing: African-American farmers (n= 287) and women who reside in farm households (n = 698). Five waves of mailed and telephone survey data and three sets of focus groups were conducted. The survey response rate was 42.9%. The attrition rate across the entire 50 months of data collections was only 33%. Among the overall sample noteworthy findings include the cultural significance of attachment to the land, defining health as the ability to work, and personal satisfaction from performing farm work as defining characteristics of sustained farm work. Although literature supports the increased prevalence of depression among the general population of the elderly only 12% of the sample had CES-D scores indicative of depression. Self- defined health conditions mirror those of the general population, led by arthritis (53%), hypertension (51%), back problems (32%), hearing loss (26%), and vision deficits (24%). The number and severity of health conditions increased with age. The crude farm related injury rate of only five specific injuries (lacerations, burns, fractures, amputations, and sprains/strains) was 14.9 per 100 farmers for males and 4.4 for females, reflecting the increased risk for injury when older farmers do *any* farm work. The mean number of farm tasks reported at baseline was 9.5 (SD = 5.6), with 5.7 tasks by women, compared to 12 tasks for men. The number of tasks reported decreased as a function of age. The number of farm tasks reported by each age grouping *increased* over time, a finding that was not anticipated. Females reported significantly less farm work than males. The sample scored high is self-efficacy (particularly Black males), supported by the finding that 46% of the final sample was not likely at all to stop farming in the next 5 years, despite policy changes and health conditions. By the end of the study only 15% of the sample was dependent on farm income for more than half of their total income (28% at baseline). This decreased reliance on farm income is mirrored by family farm operations in the United States. However, like most American farmers, even these older farmers bolstered their incomes by off-farm work (43% of the sample).

Triangulation of quantitative and qualitative data supported attachment to the farm, including the land itself and the work on the farm, as leading indicators of sustained farm work by aging farmers. Older farmers made use of technology although younger farmers (ages 50-59) were more likely to make capital investments to make farm work easier. Older farmers were more likely to allow others to take over farm tasks or to scale back the size of the farm operation.

Findings from the study are being disseminated to the farm community, scientific audiences and others who interface with farmers. Work is in progress to design occupational counseling appropriate to age, gender, and race, as well as health and safety programs for aging farmers.

### Highlights/Significant Findings

Data were gathered across a 50 month period (2002-2006) to allow for capture of seasonal variation in farm work. Analyses of the data looked at both cross sectional and longitudinal results as well as subsets of the data by race, gender, age, and retirement status. Highlights of analyses to date are noted below.

- The study obtained 1,423 usable surveys (Response rate, 42.9%) at baseline. The attrition across the 50 months of the study period was commendable: only 33% of the sample left the study. Reasons for attrition included death or worsening illness, no longer in farming, unable to contact subject. Only 245 refusals were noted after initial enrollment.
- Demographics- Twenty percent of the sample was Black, 79% White, and one percent American Indian and “Other”. A nearly equal gender split was achieved (51% male, 49% female). The majority (89%) owned their farms, 69% of the farms had both crops and livestock. At baseline, 28% reported that income from the farm accounted for over half their total income. This dependence decreased to 15% by the final wave of data collection. Farms had been the family for about 2.5 generations. Most of the subjects reported a long history with farming: 78% had done farm work before age 18. Forty-two percent of the subjects also worked an off-farm job. Seventy percent of the subjects ages 50-59 worked an off-farm job. Off farm employment declined with advancing age.
- The self- perceived health item from the National Health Interview Survey was used. Farmers considered themselves to be in relatively good health. Only 8% reported being in poor health. Older subjects were more likely to report being in poor health. The number of health conditions exhibited an inverse relationship with self- reported health status.
- When asked to select their definition of health from a listing of generally accepted definitions (or provide a definition of their own), 40% of the subjects defined health as the ability to work.
- A listing of 18 health conditions reflective of the gerontological and farm literature resulted in an average of 3.2 health conditions overall. White males reported a significantly higher number of health conditions compared to Black males and females of either gender. The number of health conditions increased with age. The leading health conditions were arthritis (53%), hypertension (51%), back problems (32%), hearing loss (26%), and vision deficits (24%). The majority (78%) reported taking prescription medications on a daily basis. Nearly a third (31%) either were not current on tetanus immunization or did not know. Women were less likely to be current than men.
- Overall, the sample exhibited low depressive symptoms scores, however, as time progressed the depressive symptoms scores increased somewhat, mainly due to increased scores in the oldest age group (80-89). Interventions targeted to the mental health of this advanced age group may be warranted. White men had significantly lower scores than all other groups (low scores indicate lack of depressive symptoms).
- Almost all subjects (96%) reported having a regular health provider and they saw the provider an average of twice a year. However, a small percentage (6.6%) reported delaying medical care because of cost and 9% reported delaying dental care because of cost. Delay of care was not predicted by health insurance coverage, race, or gender. Those who defined their health as “poor” were more likely to delay care.

- The self-identity of the farm resident is tied strongly to the land. Even when faced with declining health, participants in the focus groups acclaimed planning for work and the future in terms of what will happen to the land, rather than the individual. Over  $\frac{3}{4}$  of the sample planned to pass the farm on to someone in their family.
- Injury data were collected on only five serious types of injury: lacerations requiring medical intervention, burns, fractures, amputations, chemical reactions, and sprains/strains. From this limited listing the farm related injury rate was 14.4 per 100 farmers for males and 4.4 for females. Given the limited data and that exposure for those injuries may have been very low, this injury rate is higher than expected for this cohort.
- Work and health are closely aligned. Focus group participants expressed work as a therapy, a hobby, an enjoyment of life. Many did not view what they did on the farm as work. They feared that if they stopped working they would become depressed, even possibly leading to suicide.
- The mean number of farm tasks reported at baseline was 9.5 (SD = 5.6), with 5.7 tasks by women, compared to 12 tasks for men. The number of tasks reported decreased as a function of age. The number of farm tasks reported by each age grouping *increased* over time, a finding that was not anticipated. Females reported significantly less farm work than males.
- Respondents enjoyed their farm work. Eighty-nine percent reported getting a satisfaction from performing farm work. Sixty percent rated it as a great deal of satisfaction. Farmers made adaptations to remain in farming: an average of nine changes were made to accommodate making work easier. Younger farmers were more likely to make capital investments in computers or new equipment; older farmers were more likely to scale back operations or change commodities.
- Unanticipated outcomes: Congress passed the Fair and Equitable Tobacco Reform Act of 2004 (FETRA, also commonly known as the tobacco buyout), which eliminated the government tobacco quota and price support system. Because so many of the sample (50%) relied on tobacco as a commodity, the immediate impact of this landmark decision which literally redefined the culture and economic foundations of Kentucky agriculture, and to a lesser extent in South Carolina, needed to be captured. An additional household survey, focused on the work and health implications of the tobacco buyout, was completed by 485 subjects in April 2006. Over half (68%) of the respondents reported that the buyout would have no effect on their plans for the future. Nineteen percent reported it would improve their retirement options, and 16% stated it would allow them to scale back farm production. Only 3.4% felt the new policy would force them to work more on the farm. Equivocal results were noted for how the buyout would affect their overall financial situation. Forty percent felt it would improve their situation, 15% feared it would place them at a financial disadvantage, and 45% indicated they felt it would not affect their finances at all. These data provide insight into the perceived effects of a major policy shift and can be used to help understand how farmers perceive imposed changes in their occupation. Caution should be used in interpreting these results as only 15% of the sample relied on farm income for over half their household income. Results may be different for persons who rely more heavily on farm income. An R21 was submitted to examine the effects of commodity change more closely. That proposal is still in review.
- In March, 2007, the first Conference on the Aging Farm Community: Using Current Health and Safety Status to Map Future Action was held in Indianapolis, Indiana. Forty persons from across the United States and Canada engaged in agriculture, research, health care, agribusiness, and safety programs affirmed the need for targeted interventions that would reduce illness and injury to aging agricultural producers. Results from this study presented by the PI at the invitation of the

conference helped outline the next steps for research, programs, and interventions for this vulnerable work group. Collaboration with fellow researchers has resulted in an R21 proposal based on the results of this study and the conference to test the feasibility of strategies for safety of older farmers.

### **Translation of Findings**

The purpose of this study was to provide a foundation that can be used to develop interventions to optimize healthy and safe working conditions for older farmers and to provide a better understanding of what motivates them to remain in their vocation. As a result of this study, work is already in the planning stages to develop farm task guidelines for aging farmers to assist them in deciding changes that need to be made based on their physical and mental health conditions. Findings from this study were also shared with the National AgrAbility program that assists disabled farmers to remain in their beloved farming occupation. It is suggested that a closer working relationship be supported between research and field work such as AgrAbility to more readily translate research to practice.

The high injury rate based on only a select few types of injury among this sample indicates that older farmers are subject to serious injury while engaged in farm activities. In this sample of aging farmers, farm work tended to increase across time, thus exposure may actually increase as farmers age. These findings also support the need for interventions to reduce injury risks for these aging workers. In addition to the need for work guidelines particular focus should be placed on ergonomic interventions to reduce sprains and strains; the leading cause of injury among this cohort of older farmers.

While depressive symptoms scores for this sample were very low (a positive finding), it is counter-intuitive to the high suicide rates reported for the farm occupation. It could be that the enrollees in this study were satisfied with their vocation and its outcomes, thus the scores may reflect selection bias that is often found in convenience samples. However, given the increasing scores with advancing age, the depressive status of aging farmers and the influence of depressive status within couple dyads, should be more fully explored.

The anecdotal evidence that farmers rarely retire was supported in this study. Until this study the cultural aspects of why this phenomena exists has not been examined in concert with actual work practices. We suggest further multidisciplinary studies to see if these same dimensions of work are present in younger farm families.

### **Outcomes/Relevance/Impact**

The aging of the farm population is not just an issue in the U.S. but in all developed nations. There is a growing international (U.S., Canada, Australia) literature addressing the issue of the aging of the farm population (e.g., Bollman, 1999). Most of this literature falls into three basic categories: the higher probability of unintentional injury or death for older farmers; the health conditions of older farmers; and factors associated with the intergenerational transfer of farm assets. A theme that links these lines of research is the persistence of work among older farmers -- because farmers are working longer, they are at greater risk to serious health conditions and unintentional injuries and, they continue to farm either because they have no one willing to take over the farm or, they are unwilling to give up their life's work. What draws much less attention is the question: How do older farmers adapt their enterprises so that they can continue to farm to a much older age?

This question is significant for the future of agricultural production in America and most developed nations. Why? Because an increasing proportion of today's active farm population are seniors and, for a variety of reasons, this number will continue to grow as we move into the future. Farming is no longer a career that attracts the children of farmers who find greater opportunities elsewhere. Many farm parents actively discourage their children from entering into farming, wanting their children to have a more certain and profitable future than what they see as available in farming today. The economic uncertainties of farming in a global system combined with the high, almost prohibitive, costs of land and machinery, as well as the scale of farming required to be competitive reinforce these trends. Family farmers are the most rapidly aging workforce in the U.S., hence a better understanding of the issues this population will face as they grow older is essential for providing quality social services to meet their needs. Because of the cultural context of farm life, work modification counseling may be more beneficial for the aging farmer than abstinence from work.

The most immediate outcome of this research was the large dataset on senior farmers' work, health and sociocultural dimensions of their persistence in farming. This dataset is rich with aspects of decision-making that has not been explored in epidemiologic studies of family farmers to date. Work is in progress to harvest end products of both the qualitative and quantitative data. The rudimentary model of sustained work is the first of its kind and can be used by multiple professions to launch further exploration and to plan interventions.

Although the project did not attain its goal of 400 Black farmers, the data are robust enough to provide meaningful analyses for Black farmers, few studies to date have been able to achieve this (the exception being the National Agriculture Study that focuses on pesticide applicators) and none address the broad spectrum dimensions found in this study. In a like manner, the enrollment of females produced one of the largest datasets on women in family farming. Finally, we were able to explore the effect of spouses engaged in family farming. One example of this is the spousal effect on depression. Impact. Looking at longer term impact of the project these data and findings have been shared in class rooms of undergraduate and graduate students. Just exposure to the data has made students more knowledgeable and cognizant of the effects of farming on the health of senior farmers. This knowledge will be carried into their respective fields. This is of particular importance to nurses, who may be able to provide more appropriate care for their farm clients.

Professional impact has already been realized. This project was a launchpoint for international collaboration for developing work guidelines for aging farmers. An R21 proposal to test the feasibility of such guidelines is currently in review. Presentations and publications from these data have provided scholars with new insight into the gerontological aspects of farming. New multidisciplinary collaborations may result in "new blood" to conduct further studies and interventions.

Last year (2007) the first national conference on aging farmers was held. This project provided meaningful and innovative findings for the group to consider. Other than national surveillance on injuries, it had the largest sample size largest study presented. It was evident at the conference that very little attention had been paid to the aging farmer. As more farmers enter the occupation as second or third careers, as the baby boomers purchase farmland and establish themselves, and as the exodus of young people from farming continues, findings from this study will be even more important in shaping the interventions to make farm life as healthy and safe as possible for senior farmers. The geographic confinement of the study precludes generalization of the findings to a national level, however, it does provide enough insight to test in future studies in other regions and to test the feasibility of innovations that can safeguard these vulnerable workers.

## Scientific Report

### Background

The occupational fatality rate for workers age 55 and over is far greater than that for younger workers (Hartley et al., 2002). Agriculture has long been recognized as one of the most hazardous industries in the nation (Myers, 1990; Murphy, 1992; USDHHS, 1998). While the actual number of farms declined in the past decade, the percentage of older farmers increased (U.S. Department of Agriculture, 2002). As with the rest of the United States workforce, America's farmers are aging. The average age of principal farm operators was over 50 in all states in 2002, with the last Census reporting an average age of 55.3 (Allen & Harris, 2005). In addition, farmers over age 65 now comprise 26.2 percent of all farm operators. Older farmers continue to be overrepresented in injury prevalence, yet little has been done to specifically address work reorganization or task assignments of senior farmers. In addition, there are unknown numbers of spouses and other laborers in this age group who contribute to the farm work force. The average age of farmers will continue to escalate over the next 25 years (Dohm, 2000). A number of persons "retire" from a nonfarm career into farming or, shift from part-time farming to full-time farming. For example, Gale (2002:29) estimates that "about 25,000 operators in the 65-and-older age group entered farming each year from 1978 to 1992."

Hernandez-Peck (2001) noted two trends leading to the "graying" of the farm population – the aging up of the existing population of farm operators combined with the declining numbers of young persons entering farming. "The proportion of farmers age 55 and over has risen from 37% in 1954 to 61% in 1997. In contrast, the share of farmers less than 35 years old has declined from 15 percent in 1954 to 6 percent in 1997. According to the U.S. Census of Agriculture, the only age category showing a substantial increase in 1992 included farmers age 70 or older." (Hernandez-Peck, 2001). Allen and Harris (2005) presented a detailed analysis of the demographic characteristics of the farm population based on the 2002 Census of Agriculture. They reinforced the observations of Hernandez-Peck by noting that the average age of farm operators has been over 50 and increasing since 1974 while the proportion of farmers with an average age of 35 or less has been declining over the same period. Thus, by 2002, farmers age 65+ represented 26 percent of all operators while those age 35 or less were only six percent of farm operators.

Older agricultural workers comprise a significant proportion of the work force who suffer farm-related injuries, and the severity of injury is more pronounced than for younger workers (Browning et al., 1998; Marsh & Myers, 2000; Myers et al., 2007; Pratt et al., 1992; USDHHS, 1998; Zwerling et al., 1995). The normal aging process and the demands of mechanization may place the aging farm worker at even higher risk for occupational injury. Conversely, advanced technology, the farmer's work experience, family dynamics, and cultural ties to the land may facilitate the older farmer's ability to remain productive. Many older farmers have experienced the shift from horse-drawn equipment and manual labor to computerized tractors and automated farm tasks. The effects of these multidimensional shifts in the agricultural industry on the older worker have not been systematically explored.

Only 24% of older farmers are projected to leave their occupation in the next decade (Dohm, 2000). Farmers rarely retire from their lifelong vocation of physical labor; thus it is important to examine the impact of cumulative occupational exposure and its effect on the ability of farmers to continue to work. Examining the sustained work of older farmers by describing their work patterns, health status, and sociocultural environment may assist in reducing the proportion of older farmers who suffer work-related injuries and fatalities.

The majority of family farms are exempt from most regulations of the Occupational Health and Safety Act (U.S. Department of Labor, 2007). Self-regulation replaces Federal statutes, frequently to the detriment of farm workers' health. Furthermore, many farms depend on the labor that resides on the farm—primarily the spouse and children. There is very limited research published about aging farmers, and virtually nothing is known about the health and work roles of older female farmers and African-American farmers.

The latest figures note that 52.9% of all agricultural workers are over age 45, compared to only 40.5% of all other occupations (U.S. Department of Labor Bureau of Labor Statistics, 2006). Currently, over half of America's farms are operated by persons age 55 and over and 17% of the farms are operated by persons over age 70 (U.S. Department of Agriculture, 2002). Little is known about the health status of these older workers, their work organization, or why they remain in this hazardous occupation.

A unique aspect of farming is the persistence of work among older persons. Most farmers say that they will farm as long as possible (Reed & Claunch, 2000). They may "cut back" what they do or the amount that they farm, but they will always farm. They do not foresee themselves stopping due to health or age reasons. As many farmers have expressed, "it's in the blood". The farm is their love. They see value in knowing what they are eating and how it was grown. This lifestyle/activity is their therapy for life and the lifestyle encompasses the entire farm family. Retirement is a process of transition rather than a single event. What explains the persistence of work? What changes are made to accommodate the demanding occupation? What impacts older farmers' decisions to cut back or change the way they perform farm tasks? This six-year cohort study was conducted to answer these questions.

### **Purpose**

Farmers continue to work long past usual retirement age; however, little is known about their occupational exposure, work practices, or the factors that influence their decision to remain in the field. The primary purposes of the project were to examine the sustained work of older farmers and to develop a model that would be useful in developing age-appropriate health and safety programs and other interventions to enhance the occupational safety of older farmers. The study built upon baseline data collected in 1994-1996 by the Kentucky Farm Family Health and Hazard Surveillance Project (Browning et al., 1998).

Epidemiologic data on the health status and work behavior of older family farm members, their relative contributions to agricultural production, and the basis for their decisions to continue working were collected to provide an enhanced understanding of the sustained work of this aging cohort by examining their health status, type of farm enterprise, work organization, and the influences of culture, technology, off-farm work, and policy upon older farmers' work. Valuable baseline data for African-American farmers and farm women, two groups notably absent in current agricultural databases, were also gleaned from this study.

### **Specific Aims**

The specific aims of this study were to:

1. Develop health profiles (including physical and mental indicators) of older male and female farmers.
2. Develop exposure profiles for tasks related to agricultural work of older farmers.
3. Identify the social, health, behavioral, and work environment factors that contribute to the task-specific sustained work of older farmers.

4. Explore the sociocultural, family, and economic factors that influence the work practices and health of older farmers.

The aims are congruent with the Healthy People 2010 objectives 20.1 and 20.2 to reduce farm worker fatalities and injuries (US DHHS, 1999). Moreover, the project focused on the special populations most at risk for poor outcomes of injury and illness: older persons, women, and minorities. The study focused on the agricultural sector of the National Occupational Research Agenda, specifically on health and work environment of aging farmers. By examining the sustained work practices of older farmers, we identified (a) factors that influence the decision of older farmers to remain in the work force and (b) the health and work conditions that place them at risk for injury and illness. These findings resulted in a model of sustained work that will be useful in developing age-appropriate health and safety programs and other interventions that can enhance the occupational safety of older farmers.

In addition, the data provided opportunities to describe the characteristics of women in farm households and of African-American farmers, two groups that are often missing from the literature.

### **Social Context of Farming**

The ties that bind farmers to the land extend beyond economics (Buttel et al., 1984; Garkovich et al. 1995a; Reed, 1996). Rural males define health as the ability to work (Laffrey, 1986; Reed, 1996; Reed & Claunch, 1998). In a study on occupational rehabilitation of farmers with upper-extremity amputations, participants reported that family and community expectations placed upon the injured farmer were factors in the swift post-injury return to the fields, but personal attachment to farm life was the primary motivation to continue farm work (Reed, 1996). Farm identity and attachment are psychological concepts related to the contextual focus of an individual's self-identity. Research suggests that farming, and in particular family farming, holds multiple meanings for those involved in this activity. The farm may represent the commitment of several generations to a particular place (the land) or a heritage to be transmitted across the generations (Salamon, 1992; Sontag, 1996). Two issues of interest for this study were (a) the degree to which being a farmer and/or engaging in farm work is incorporated into the individual's self-identity; and (b) the degree of psychological attachment to the farm (and its work) as home and center of life activities.

While there is a substantial body of literature related to farm families' sense of well-being or perceptions of quality of life, there is less research on the question of how these are related to self-identity and attachment to farming. Garkovich and Bokemeier (1988a) found that the greater the family's dependence on farm income, the greater the sense of attachment to the farm and the reported level of satisfaction with farming. Moreover, these relationships intensified with age. Farm women who expressed a strong attachment to farming and contextualized their identity within the farm were more likely to be involved in farm work and to express high levels of farm life satisfaction.

For older farmers who have spent a lifetime of work in an economic enterprise that they define as "more than a job," a psychological imperative may underlie the persistence of active involvement in farming activities. For persons who have a strong attachment to the farm and farming and define their self-identity in the context of the farm and farming, withdrawal from the physical labor on the farm may appear to be cutting out the essence of their self. Reports relating the association of increased stress in farming to farm work-related injury emphasize the need to incorporate psychological variables when studying occupational exposure (Kidd et al., 1996; Reed & Claunch, 1998). Depression has been linked to an increased prevalence of farm injury (Zwerling et al., 1995), and Stallones (1990a, 1990b) reported the high prevalence of suicide among farmers.

There are other contributing social factors—including type of farm enterprise, household, family and individual factors—that may influence the decision to continue farming. Older adults' perception of the adequacy of their financial resources affects the decision to continue doing farm work. Garkovich found that for many farm couples, perceptions of their financial situation strongly influenced their intentions to continue farming (Garkovich et al., 1995b).

Structural factors that influence opportunities for labor substitution on the farm include the availability of farm household members to participate in farm work (e.g., age, gender, employment off the farm); whether the farm is operated as a formal or informal partnership; the availability and cost of hired labor; and the degree of mechanization in the enterprise (Bokemeier & Garkovich, 1987; Buttel & Gillespie, 1984; Fassinger & Schwarzweller, 1984; Rosenfeld, 1985). However, it is likely that for older farm operators, the most critical factors for sustaining farm work will be the ownership/management structure of the enterprise (i.e., sole owner, partnership) and the degree of mechanization. Research (Garkovich et al., 1995a) suggests that the presence of one or more adult children who are also engaged in farming (possibly in a formal partnership or an informal sharing of work and machinery) increases the likelihood that older farm operators will reduce their overall level of physical activity or modify the set of physical activities that they perform on the farm.

### **Health and Behavioral Factors**

Complex and multidimensional physiological and psychological changes may place older farmers at a higher risk for injury and poorer outcomes than their younger counterparts. For example, physiological changes involved in the aging process may include impairments, disabilities, and handicaps experienced by older adults and thus increase their susceptibility to injury (Albert, 2004; Amshoff & Reed, 2005; Kilijanek & Drabek, 1979). Older adults may have endured or “weathered” storms or other dangerous situations throughout the course of their lives and may perceive that now being an older adult farmer mitigates potential dangers from farming at advanced ages (Kilijanek & Drabek, 1979; Seiz & Downey, 2001).

Functional cognitive declines associated with normal aging may decrease older adults' ability to comprehend and act in risky situations that may be associated with farming (Lach et al., 2005). Specifically, research clearly indicates an age-related deficit in working memory (Whitbourne, 2001). Such functional declines are a part of the normal aging process and do not necessarily involve dementia and clinically significant memory loss (Massey, 1997). Stress experienced by older adults has also been found to have a negative impact on their immune system and overall health (Whitbourne, 1999). Stress and its relationship to injury among farmers has been documented (Kidd et al., 1996; Thu et al., 1997; Simpson et al., 2004). Risks and stress associated with farming only increase with age and these age-related declines in function.

In addition to general risks associated with cognitive decline, older adults are less likely to survive serious injuries than their younger counterparts (Bolin & Klenow, 1983; Kilijanek & Drabek, 1979; Lach et al., 2005; Massey, 1997; Phifer, 1990). For example, cardiovascular system and kidney function declines associated with aging adults increase their vulnerability to even slight changes in electrolyte balance and fluid volume (Lach et al., 2005). Compounding these risks, and to treat these chronic conditions, many older adults typically consume more medications than middle-aged or younger adults (Brodie et al., 2006; Lach et al., 2005). Increased consumption of pharmaceuticals exacerbates the risk for older adults to experience negative drug interactions and adverse side effects. A literature review by Voaklander and Umbarger-Mackey (2007) noted relationships between injuries to farmers and their use of several classes of medications.

Rural persons have more chronic illnesses than their urban counterparts (Wallace & Wallace, 1998). Persons living in rural areas also reported greater numbers of acute health conditions and injuries than their urban peers. Rural residents experienced more chronic health conditions, including arthritis, cataracts, hearing impairments, loss of extremities, orthopedic impairment, diabetes, heart disease, hypertension, and emphysema. These findings are similar to those reported for older farmers in Kentucky (Browning et al., 1998; Heath et al., 1999). Based on the 1980 NHIS Occupational Survey, a report on gender differences of longest held occupations, Cooper et al (1993) noted that among persons ages 17-24 who worked in agriculture, 23.8% of females and 16.5% of males reported activity limitations due to chronic conditions. The proportion increased to 50.9% and 60.5% respectively after age 65. These data suggest that the cumulative effects of farm work may be underestimated by existing reports. Cooper recommended further investigation of health measures of farmers to more fully understand these findings. This study focused on health measures and track task-specific work patterns, exposure, and associated health conditions of older farmers by gender and race.

The price extracted from the farmer is often high; older farmers exhibit excessive work-related fatality rates (Gerberich, 1995; Lehtola et al., 1994; Marsh & Myers, 2000; Zwerling et al., 1995). The high mortality should not be surprising, as older adults succumb to injury and illness younger persons could survive. The etiology of farm injury has been consistently documented across studies, with farm machinery, falls, and animal-related injuries being the three main external causes of injury (Brison & Pickett, 1992; Browning et al., 1998; Norstrom et al., 1995; Zhou & Roseman, 1994). A higher percentage of older farmers die each year as consequences of tractor related incidences than any other age group (Struttmann et al., 1994; Pratt & Hard, 1998). Non-fatal injury rates reported for older farmers have been somewhat inconsistent, perhaps due in part to the small number of studies and the methodological limitations of case reviews and cross-sectional surveillance; however older farmers consistently demonstrate a high prevalence of non-fatal injury (Layde et al., 1995; USDHHS, 1998; Zwerling et al., 1995). Injury reports to date have been primarily restricted to White farmers. Few results based on race and gender have been reported because of the small numbers of minorities and females in the studies. Kraus (1985) reported a ratio of expected frequencies of work injuries by race and gender, with the ratio of White to Black males being 106:91 and the male to female ratio being 90:23. Despite this early work, no further testing of this ratio has been done. Myers et al., (1999) reported that the death rate of female farm workers age 55 and older was twice that for females under age 55. This study added valuable gender specific insight on the risk of injury to African-American and White older farmers.

Virtually nothing is known about the long-term consequences of injury, with no literature that reports injury outcome except in descriptive reports of “temporary” versus “permanent or serious” disability (USDHHS, 1998). Based on national data, farming has been reported as the leading female broad occupation base and the second leading base for males with regard to workers with disability (Leigh & Fries, 1992). Moreover, the seriousness of disability reported was alarming: for both genders, farmers had the highest levels of disability of any occupation except construction. Increased attention needs to be given to the epidemiology and consequences of injury, such as work limitations, for this vulnerable group of farm workers.

This study provided evidence of the health and occupational injury status (and how these variables affect the farm work) of aging farmers. It also provided occupational health baseline data on African-American farmers and female older farmers.

## **Work Environment**

Farmers are constantly surrounded by their work environment. They live where they work. A variety of factors may influence how older farmers structure and conduct their labor. Mechanization of agricultural production enables farmers to produce larger crops but extracts an alarming toll in human injury (Baker et

al., 1992). The rapidly changing technologies and economy in agriculture (computerized feeding, genetic engineering, competing demands for land use as urban areas expand, recent economic downswings, and increasing regulations) are all part of the work environment of the farmer.

Mechanization has enabled farmers to perform farm work (e.g., plowing, mowing) at both an earlier and a later age. For example, the development of the round baler has enabled older farmers or those with chronic conditions (e.g., arthritis) to continue raising cattle because they can harvest, bale, and feed without ever having to physically handle the hay. It could be argued that as more opportunities to mechanize emerge, it is less likely that age or chronic health conditions will limit the work of older farmers. However, this influence is mitigated by the willingness of farmers to make the significant capital investments required to mechanize (Garkovich et al., 1995b). Mechanization also fostered the epidemic of farm fatalities (Baker et al., 1992). A higher percentage of older farmers die each year as consequences of tractor related incidences than other age groups (Pratt & Hard, 1998; Struttman et al., 1994).

Off-farm work has always been a source of a portion of total farm household income (Fuller, 1991). Since 1960, off-farm employment has represented an increasing share of total farm household income for an ever-growing share of farm households, especially for smaller farm operations (Ahearn & Lee, 1991; Barlett, 1991; Gold, 1997; Hallberg et al., 1991; Salant, 1984; U.S. Bureau of Census, 1992). The most common explanations for off-farm employment are to provide a steady source of cash income for farm families, to obtain access to private health insurance, or to gain access to or to diversify retirement income. In some cases, off-farm work emerges as a strategy for continuing to stay in farming when a full-time farmer finds it difficult to satisfy income or lifestyle expectations on the returns from farming alone. In other cases, the off-farm job provides the cash resources to establish the scale of operation required to support a family solely on the earnings from farming.

There are other implications of off-farm employment. The scale of the enterprise tends to be smaller; certain commodities (e.g., dairy, nursery crops) are less likely to be produced; and the timing of farm work shifts so that most of the work is done in the evenings and on weekends after the responsibilities for off-farm work are completed. Finally, there is a greater expectation for the spouse to participate in a broader range of farm activities. Barlett (1991) and others (Garkovich et al., 1995a; McCoy & Filson, 1996) note that off-farm employment increases strains on the farm family and reduces satisfaction with farm life as spouses try to juggle farm and off-farm labor demands (Danes & Keskinen, 1990; Godwin, 1991; McCoy & Filson, 1996). Added economic stresses, along with role overload, are consistent with the Farm Family Stress and Injury Model and recent psychological reports (Kidd, et al., 1996; Mulder, et al., 2000).

During the farm crisis of the 1980s, considerable research on the impacts of economic and environmental pressures on farm families emerged. But while a drought combined with dramatically falling prices or dramatically increasing costs are obvious examples of farm family stressors (Bultena et al., 1986; Rosenblatt & Keller, 1983), there are others (Olson & Schellenberg, 1986). For example, family farms are operated by families, often multiple generations and multiple families within the same generation, who spend many hours every day working together and often living “in each other’s pockets.” While this can, at times be a positive resource for farm families, it is also a frequent source of stress (Garkovich et al., 1995a; Rosenblatt & Anderson, 1981). Research suggests the following stressors within farm families: the age- and gender-structured division of labor (Rosenblatt & Anderson, 1981); the distribution of decision-making authority (Marotz-Baden et al., 1988); the approach to the intergenerational transfer of the business enterprise (Garkovich et al., 1995a; Marotz-Baden et al., 1988); wives’ off-farm employment (Knaub et al. 1988); and the fundamental stress of negotiating multiple role expectations (Draughn et al., 1988). As one reviews the literature on farm family stress, it is easy to understand why farm operators have one of the highest suicide rates of any occupational group. What is less understandable is the persistence of sustained work and involvement in such a stressful enterprise.

## **Farm Women as a Special Population**

The family farm depends on the labor and management contributions of all family members regardless of age or gender. This is not to say that there are not clear gender and age differences in farm task allocation. Since the 1970s, a considerable body of research has emerged addressing the factors that influence the ways in which farm tasks are allocated on family farms. The most consistent conclusions are as follows. A significant proportion of women work a substantial amount of time at a variety of farm tasks, even though a much smaller proportion will identify themselves as “farmers” (Bokemeier & Garkovich, 1987; Reed et al., 1999; Rosenfeld, 1985). There are gender differences in farm tasks. Women are most likely to handle the financial management tasks (e.g., bookkeeping, paying the bills) and to a lesser extent engage in direct production activities. However, women’s participation in field work is often centered on care of young livestock or those production activities that do not require a considerable amount of work with chemicals (Buttel & Gillespie, 1984, Fassinger & Schwarzweller, 1984; Reed et al., 1999; Rosenfeld, 1985). Women’s involvement in farm decision-making varies tremendously given the size of the operation, the type of decision being made, the organizational structure of the enterprise (e.g., presence of adult male child as partner), and the wife’s self-identity as a “farmer” (Bokemeier & Garkovich, 1987). While the body of literature for White farm women is growing, there is no comparable base for African-American farm women, whose life and work experience may be very different. This study addressed that issue.

## **Research Design**

This study used a prospective design with a fixed cohort to investigate the social, health and behavioral, and work factors that contribute to sustained work by older farmers. Both quantitative and qualitative methods were used. The design used traditional epidemiological methods of collecting surveillance data via mailed and telephone surveys across 50 months. These data were analyzed in an on-going fashion to frame interviews for focus groups that elaborated on the behavioral and social factors that were not conducive to the more confined survey techniques. Our design allowed comparative analysis between quantitative and qualitative methods, an analysis design not possible in past studies. Historically, qualitative research has been used in agricultural health studies for pilot work and with children (Kidd et al., 1996; Kidd et al., 1993) and to explore sociocultural dimensions of farming within farm families (Garkovich et al., 1995). Qualitative methods, which make use of the oral history tradition of farming, have been shown to be especially valuable when conducting research with older persons (Kidd et al., 1993). This study enabled us to quantify the contributions of sociocultural and psychosocial factors to the decision to remain in farm work. Previously these factors have only been reported qualitatively. Thus, this study builds the research methods base for agricultural health.

## **Theoretical Foundation**

This project did not test a particular behavior theory; rather it incorporated concepts of relevance to theories of change in behavior. The primary purpose of the project was to examine the sustained work of older farmers. Previous examinations have descriptively noted that older farmers continue to work even when they experience poor health and inadequate financial reward for their labor, and when few of their children are willing to “go into” farming and/or few individuals are willing to undertake farm work as paid laborers (Garkovich et al, 1995; Reed & Claunch, 2000). To date, few researchers have applied theory when they have examined older farmers’ decisions to sustain work. What theories would help develop a better understanding of why older men and women continue to farm past the norm of retirement? What meanings do older farmers attach to: (a) their actual work on the farm, (b) the value of farm ownership, and (c) the “family” aspects of their occupation? Three theoretical perspectives offered possibilities for developing a better understanding of the choices men and women make regarding their

continued work on family farms. Social Constructionism, Social Exchange Theory, and the Theory of Reasoned Action provided propositions that could be used singularly and as points of theoretical convergence to increase our understanding of older farmers' sustained work.

*Social constructionism* (Berger & Luckman, 1966) is useful for understanding the ways in which we (as individuals in society) create social rules, roles, and functions and how this creation takes on a life of its own to act back upon its creators to determine behavior and the meanings individuals attach to everyday life. In our particular context, social constructionist views provide guidance in understanding the historical and cultural meaning of family farming. We hypothesized that the historical context of American agriculture has created a family farm culture that influences older farmers' decisions about sustaining active farming. The social construction of family farming determines the meaning that older farmers attach to their occupation and, in turn, influences their decisions about whether to continue or relinquish work. We believed that during group interviews, older men and women would provide evidence of the meanings they attach to family farming not only as an occupation but also as a way of life. Other points we expected to be enlightened by the socialist constructionist perspective included: (a) the clash between older family farmers' perceptions about their work and those of mainstream society, (b) older farmers' "family investment" in maintaining the family farm, (c) older farmers' perceptions about the realities of farming for younger family members, and, (d) differences that might be expected between racial and gender groups.

*Social exchange theory* (Homans, 1958; 1974) was the second perspective employed to examine older farmers' sustained work. Simply stated, a social exchange perspective posits that as long as rewards outweigh costs, activities/relationships will continue. Social exchange previously has been useful in developing greater understandings of family and other social relationships. Family farming provides an excellent context for examining the fluid boundaries between family and work roles that often occur in family owned businesses. Qualitative research suggests that family farming represents the interweaving of family and farming values that reflect an American social construction of family farming lifestyle. Until this study, we knew virtually nothing about the reasons older farmers continue to work or the process by which older farmers evaluated their continuance of specific farm tasks. We believed that a social exchange perspective would be helpful in examining the "costs" and "rewards" of family farming as expressed by older men and women who sustain work. For example, social exchange theory provides propositions for explaining why older farmers continue to work when health is compromised, profits are marginal, and few Americans currently view the occupation as personally, financially, or professionally rewarding. What health conditions become costly enough to reduce operation or maintenance of farm machinery? What financial markers influence older farmers' decisions to consider "giving up the farm?" What family factors—as both rewards and costs—influence older farmers' sustained work? This perspective was used to examine two primary questions: (1) What are the costs and rewards of family farming as identified by older farm men and women? (2) How does the balance between costs and rewards influence the continuance or relinquishment on specific farm-related tasks such as operation/maintenance of farm machinery, daily care of farm animals, and bookkeeping?

The *Theory of Reasoned Action* (Ajzen & Fishbein, 1980) is premised on a person's attitude and intention of performing a behavior, whereby an understanding of the action is attained by examining the behavioral and normative beliefs of the individual. Ajzen (1991) extended the theory to include perceived behavioral control through which the measurements of control belief and perceived power may affect the behavioral intention. This study postulated that the intent to sustain work is a reasoned action resting upon the farmer's attitude toward work and the farmer's perception of his/her ability to perform the work. These three theoretical frameworks guided the design and development of survey questions, focus group interviews, and they formed the conceptual basis of analyses.

## Study Design

Four subgroups of farm families were followed across four years to develop a model of their sustained farm work. White males, African-American males, White females, and African-American females who were 50 years old and older, resided in farm households in Kentucky or South Carolina, and indicated they participated in farm work were enrolled. In as much as possible, couples were enrolled in the study in order to examine the influences of household members on work decisions and to identify possible role shifts. Sociocultural characteristics, health and behavioral factors, and work environment data were collected via mailed surveys, telephone surveys, and focus groups.

The sample size was based on 200 per block in order to achieve a power of .80 and an alpha of .05. The sample size calculations for this study were premised on a four-step regression analysis for the prediction of older farmer's sustained work. As noted in the sample size report, the enrollment of African-American (Black) farmers was lower than anticipated, thus caution should be used in interpreting the results of the two subgroups of Black farmers. Sample size for the entire sample was sufficient for achieving power of .80, at an alpha of .05.

## Instruments

Five surveys and three sets of focus group prompt questions were developed by the research team to collect and document data needed to evaluate the sustained work patterns of the older farmers. Sets of inquiry were developed and administered for gender-specific issues, stress and depression, health conditions and subsequent restriction from work, and changes in work organization (including adoption of advanced technologies, newer equipment, and transference of work). Final versions of these instruments are included in Appendix A. An outline of the questions by wave and source is presented in Appendix B. When possible, existing instruments or questions were used. Questions crafted by the research team were based on the literature about farm work, agricultural sociology, health conditions of the general aging population and of farmers, and injury reports.

This study used many of the questions contained in the telephone surveys (Farm Health Interview Survey [FHIS]) of the Kentucky Farm Family Health and Hazard Surveillance Project (KFFHHSP). Standard questions from the National Health Interview Survey were used extensively in the development of the FHIS surveys (Massey et al., 1989). Baseline data collected in the FHIS included general demographic data on the farm enterprise (type, primary commodities, equipment inventory, acreage, income) and data on perceived health, health conditions, injuries, farm tasks, and off-farm jobs. In addition, questions about educational status, preventive health measures, participation in farm organizations, and work organization were asked. For subjects in the KFFHHSP who participated in this study, these data were used for historical comparative analysis.

The National Health Interview Survey (NHIS) served as the source for perceived health, delay in medical and dental care, race, and ethnicity. The NHIS Supplement on Aging questions on difficulty with mobility and fine motor movement were used. The Pittsburgh Sleep Quality Index (Buysse et al., 1989) was used to determine sleep quality and to screen for sleep apnea. The 20 item Center for Epidemiologic Studies-Depressive Symptoms Scale (CES-D) (Radloff, 1977) was used for depressive symptoms and the John Henry Active Coping Scale (JHAC12) (James et al, 2002) was presented for insight into the coping skills of the aging farmers.

Questions on retirement were gleaned from the Iowa State Rural and Farm Life Poll (2003), the retirement studies of King (1995) and Bokemeier and Garkovich, (1987), and supplemented by the research team. The NE-177 National Dairy Study (National Dairy Community Study, 1999) supplied questions on role on farm, farm history, retirement, and attitudes toward policy issues. The University of

Wisconsin Dairy Study queried subjects about transference of farm property, and adequacy of income (Schwarzeweller & Davidson, 2000). For women, role on farm was described using two sources: KY Farm Women Speak Out (statewide survey conducted in 1987) and Rosenfeld's USDA Survey of Farm Women (Rosenfeld, 1985). Four items from the Perceived Stress Scale (Cohen, 1994) were included in Wave four.

It is important to note that not all items appeared on every survey wave. This created some challenges for analysis but reduced respondent burden and also was intended to decrease test-retest bias. Two sets of questions were asked in each wave: hours worked on the farm and injury incidence. These were essential to capture seasonal variation and to decrease recall decay. The variables and the timing of data collection on each type are listed in the Question Source Grid (Appendix B).

### Sampling

Study participants were recruited from two states – Kentucky and South Carolina. An overview of the agriculture component of each of these states is presented below.

*Overview of Agriculture in Kentucky.* With approximately 84,000 farms in 2005 (USDA, 2006), Kentucky ranks fifth in the nation for total number of farms, behind Texas, Missouri, Iowa and Tennessee. Within Kentucky's farm sector, nearly every type of commodity is raised, utilizing every production method in use elsewhere. From the large scale irrigated cash grains operations of western Kentucky to the horse farms and general farm enterprises of the central region to the small-scale subsistence level farming of the eastern counties, Kentucky's farms represent the diversity of agriculture in America.

According to the 2001-2002 Kentucky Agricultural Statistics (2002), in 2001 (one year prior to first data collection), slightly over 39% of all Kentucky farms had sales of \$10,000 or more compared to 54% of all American farms. The average farm size in Kentucky was substantially smaller than the national average (155 vs. 436 acres), yet Kentucky ranked in the top 20 for production of tobacco, hay, soybeans for beans, corn for grain or silage, sorghum for grain or silage, winter wheat, and barley. Kentucky also ranked in the top 20 for inventory of beef cows, all cattle, milk cows, all hogs, and breeding hogs. Cash receipts from all commodities were 3.5 billion dollars.

Kentucky farm operators are less likely than their national counterparts to state that farming is their primary occupation (41.1% vs. 50.3%). Likewise, a smaller proportion of Kentucky farmers report no days of work off the farm (35.4% vs. 39.5%); yet Kentucky farmers are more likely to be full owners of their enterprises than their national counterparts (71.5% vs. 60.0%).

In summary, while Kentucky farms are smaller than the national average, farming is a major economic activity reflected by both the large number of enterprises and the production value generated by these enterprises. With nearly half of Kentucky's population residing in rural areas, farming is an integral component of many local economies, and Kentucky's metropolitan areas also boast substantial income directly from farming as well as food-related enterprises (e.g., food processing, wholesale/retail sales).

African-American farm operators represent an increasingly smaller share of all farm operations in Kentucky, declining from 1% in 1978 to 0.64% in 1997; yet Kentucky's African-American farm operators are more likely to be full owners of their enterprise than other Kentucky farmers (78.2% vs. 71.5%). African-American farm operators in Kentucky are older than all other Kentucky farmers (average age of 60.3 years and 54.0 years respectively), and as a result, they have worked their farms longer than have their White counterparts.

*Overview of Agriculture in South Carolina.* South Carolina boasts a variety of field crops and livestock production (NASS web page <http://www.nass.usda.gov/census/census02/volume1/sc/CenV1SC1.txt> ). Corn, wheat, cotton and soybeans are the primary crops on its 24,541 farms. The average farm size in South Carolina is substantially smaller than the national average (228 versus 436 acres); yet South Carolina ranks in the top 20 for production of broilers, eggs, turkeys, cotton, peanuts, tobacco and peaches. Black or African-American farm operators represent only 1.2% of the nation's farm population, but nearly 10% of South Carolina farms are headed by African-American farmers (6.7% of the nation's total African-American farmers). African-American farmers in South Carolina are older than their White counterparts. The average age of the African-American farmer in South Carolina is 60.6, compared to the state average of 56.9.

### **Sampling lists and resultant participants**

Participants for this study were selected from three different data sources. The primary sample was drawn from a list of farmers aged 50 and older who had participated in the Kentucky Farm Family Health and Hazard Surveillance Project (KFFHHSP) in 1994-1996 (Browning et al., 1998). This listing contained 998 male farmers then over age 50, 741 farm women then engaged in farming, and an additional 747 persons classified as male part-time farmers. Persons aged 80 and over at the time of the KFFHHSP were purged from the list of eligible participants. Using the 8 year old list we anticipated that the response rate would be low as there were a number of reasons the person may not be able to participate: failing health, stopped farming, relocation, etc. In addition, our intent was to enroll couples when possible. At the time of data collection in the KFFHHSP, 96% sample was married; however, we did not know if the spouse participated in the farm operation or if the spouse would enroll in the study. Thus, we were not able to generate a true response rate from the initial mailing.

Since the KFFHHSP sample was 98% White, African-American farmers were oversampled by using a new listing of African-American farms surveyed by the Kentucky Agricultural Statistics Service in January 2000. This list contained 240 households who fit the criteria for this study and had agreed to be contacted for future studies by the University of Kentucky. A mailed survey to these households (March 2002) yielded a potential 111 additional households eligible for the study. A letter of support from the President of the Kentucky Minority Farmers Association was included with the first survey to encourage African American farmers to participate in the study.

Because of the relatively low number of African-American farmers in Kentucky, the sample of African-American subjects was augmented through recruitment by the South Carolina Agricultural Statistics Service (SCASS). This organization had the most comprehensive and up-to-date list of farmers in the state and the list contained 1,194 African-American principal operator-farmers. To enable us to identify all persons age 50 and over who were eligible for enrollment in this study, SCASS conducted a farm household demographic and enumeration survey (SC-FHADES) in April 2002. Recruitment for this group was vigorous. Post cards were mailed from the Cooperative Extension Small Farms project (headquartered at South Carolina State University) asking potential subjects for their participation, announcements about the study were made at local and regional agricultural meetings usually attended by African-American farm residents, and letters were mailed with follow-up surveys to encourage completion of the surveys. All personnel who conducted the SC-FHADES telephone survey were African-Americans.

Farm households from 86 of Kentucky's 120 counties participated in the study. The farm size was slightly higher than the state average (164 acres compared to state average of 154). The central region of the state encompassed the most participants. There was very little participation in the far Eastern counties (see Figure x), but these counties had been mostly excluded for the KFFHHSP because of the very small

numbers of farms in that portion of the state. South Carolina's participants represented nearly all of the state. The highest participation rate came from central South Carolina. The areas with the least participation were in the northwest and deep southeastern portions of the state (see Figure 1). The South Carolina farms in the study were smaller (86 acres) than the state average of 197 acres. Farm size in both states increased over time, consistent with farm size trends in the U.S. (USDA, 2006).

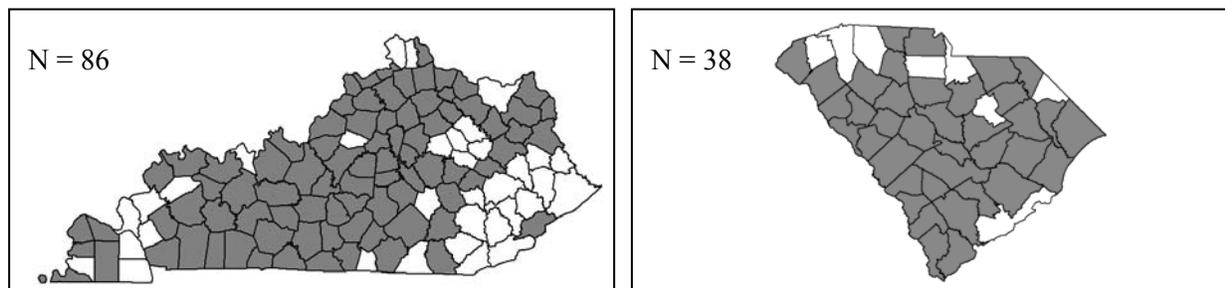


Figure 1. Kentucky and South Carolina counties included in survey (dark shading)

Spouses of participants were also recruited at the time of initial enrollment. The recruitment of couples resulted in a fairly even split between men and women across all waves (see Table 1).

Table 1. Survey completions by race and gender for each wave

	Wave 1		Wave 2		Wave 3		Wave 4	
	Male	Female	Male	Female	Male	Female	Male	Female
White	551	560	432	457	387	401	381	390
Black	167	120	126	82	109	73	107	64
Other/Unknown	7	18	8	14	8	14	5	10
Gender Total	725	698	566	553	504	488	495	465
<b>Overall Total</b>	<b>1,423</b>		<b>1,119</b>		<b>992</b>		<b>960</b>	

### Data Collection and Analyses

There were two components to the full study: the mailed and telephone surveys (quantitative) and focus groups (qualitative). The focus groups were important to examine the social and economic issues that did not lend themselves to survey research. These components were conducted concurrently. Prior to each wave of data collection (survey and focus groups), approval was obtained from the University of Kentucky Institutional Review Board. Approval for focus group data collection was also obtained from Clemson University as Dr. Charles Privette IV of Clemson directed the South Carolina focus groups. Table 2 denotes the flow of data collection and the participation for each data collection point. The timing of the survey waves was seasonally spaced to capture seasonal variations in farm work. Survey wave 5 was an added data collection point to garner data on the effects of a sentinel policy change (FETRA) that occurred late in the study period. Wave 5 surveys were mailed only to the principal operator in each

household. The results of wave 5 are presented as cross sectional data only. Wave 5 is not included in attrition reports.

Table 2. Data collection chronology

Survey Wave 1	Focus Groups Round 1	Survey Wave 2	Focus Groups Round 2	Survey Wave 3	Survey Wave 4	Focus Groups Round 3	Survey Wave 5
Sep 02- Mar 03	May 2003	Oct 03- Mar 04	Mar 2004	Jun-Aug 2004	Feb-Apr 2005	Aug 2005	Apr-May 06
n = 1423	<i>KY</i> n = 20 3 groups  <i>SC</i> n = 10 3 groups	n = 1119	<i>KY</i> n = 20 2 groups  <i>SC</i> n = 20 3 groups	n = 992	n = 960	<i>KY</i> n = 38 5 groups  <i>SC</i> n = 16 3 groups	n = 616

### Methods of Follow-up

A telephone call and/or letter introducing the study was sent to each potential respondent with the survey. A brochure about the results of the initial KFFHHSP was included in the letters to Kentucky subjects. A letter from either the Kentucky or South Carolina Minority Farm Program or Small Farm Project (operated by the state's Cooperative Extension Service) was included to add credibility to the study. Participants who completed the survey received monetary compensation. To enhance retention, the amount of payment increased for each wave completed. Postcards were sent approximately two weeks before each wave began, reminding participants of the telephone call and payment they could expect for completion of the survey. Mailed surveys were returned in a postage paid, pre-labeled envelope. Persons completing all survey waves were entered into a drawing for one of two \$300 gift certificates from Wal-Mart.

Letters and surveys that were returned undelivered were traced in an effort to locate the intended recipients. Usual tracing procedures were used (postal service, Polk directories, on line searches). The undeliverable postcards also helped track disposition of the participants.

### Quantitative Data Collection

The initial plan was to collect all survey data via mailed surveys. The first mailing and repeat mailing resulted in a poor return rate (20%). Hence, an alternate plan was devised to improve participation. The University of Kentucky Survey Research Center (UKSRC) agreed to administer all waves of the survey. The UKSRC was well equipped to conduct this work. They had previously conducted the KFFHHSP surveys and the Survey Center Director was familiar with the agricultural terms and the times of day that were most likely to result in survey completions. The PI worked closely with the SRC Director to translate the hard copy survey to a computer assisted telephone survey (CATI). The CATI versions were pretested in-house and with the PI before being conducted with the sample. The PI conducted an evening training session with the telephone surveyors prior to the beginning of calls. Quality control checks were conducted by the shift supervisors to insure fidelity to the interview and quality of data. These checks were performed through the use of a silent listening device, thus neither the subject nor the interviewer knew when the checks were done. Study participants were also given the option of completing the mailed

version of the survey if they preferred. This was especially useful for hearing impaired individuals. The UKSRC placed at least ten calls to the potential respondent in order to complete the survey. This approach yielded a much more acceptable response rate (42% total for mailed and telephone interviews of those that were eligible in the baseline wave) and was used for the first four waves of the study. Wave five was conducted completely by mail as the SRC was not able to schedule the survey. In order to boost response to Wave five the participants were awarded \$40. The response rate for that wave was 75%.

## **Quantitative Data Analysis**

Analysis of quantitative data consisted of both cross-sectional and longitudinal analyses. Exceptions to the procedures outlined below are presented with the data results.

### ***Cross-Sectional Analyses***

For each wave of the study, four major sets of procedures were used. These procedures included analysis of missing data, descriptive analyses, analysis of reliability and previously hypothesized factor structures of scales included in the study, and tests of hypotheses.

### ***Missing Data Analysis***

Individual cases were examined for proportions of missing data. Cases with unacceptable proportions of missing data were eliminated. For retained cases, imputations were recalculated for missing items. These instances are delineated in the report. Regressions imputations will be used to provide estimates for missing data (Kalton, 1983). For selected analyses, only the cases that completed the key variables were retained in the subset for that analysis.

### ***Descriptive Analyses***

Descriptive statistics, including means, frequencies, and percentages, were used to provide information about older farmers' sustained work as well as factors that were used to predict this work. Additionally, descriptive statistics were used to report general demography and socioeconomic characteristics for the full sample and each of the four subgroups (White male farmers, African-American male farmers, White female farmers, and African-American female farmers).

### ***Analyses of Reliability and Previously Hypothesized Scale Factor Structures***

For each of the scales included in the study, reliabilities and factor structure analyses were conducted. (Jöreskog & Sörbom, 1996) will be used to insure that: (a) the previously hypothesized factor structures for each scale are replicable for the subgroups of older farmers, and (b) the measured indicators for each scale adequately represent hypothesized latent constructs for the sample across each wave of the study.

### ***Comparisons by Subgroups and Changes Over Time***

The major health, work, and psychosocial indicators, including number of health problems, number of farm tasks completed in the past year, number of administrative farm tasks and number of physical farm tasks completed in the past year, number of hours worked in the past week, depressive symptoms score (using the CES-D), self-efficacy (using the John Henryism scale), and attitudes about retirement (using the Retirement Identification Scale), were summarized using descriptive and inferential methods. The mean scores were determined at each wave of data collection for the whole sample and then by the four main race/gender subgroups (Black women, Black men, White women, and White men) and finally by the

four age cohorts, defined by age during the Baseline interview (50-59, 60-69, 70-79, and 80-89). For the comparisons of age cohort groups, a participant remained in the same cohort throughout the longitudinal study, even if they aged out of the range they were in during the first interview. Also, although there were dropouts during the longitudinal data collection, the summaries and analyses below are based on all respondents at each wave, including those who did not complete the study. The rationale for this is two-fold: 1) the repeated measures modeling procedures are robust with respect to missing data (i.e., the model takes into account the fact that not all participants are complete at every timepoint and this is not a computational problem); and 2) a second series of models based on only those who completed all waves was considered with no substantive changes to the conclusions noted. In other words, the means and comparisons presented here, while based on the full sample of those who participated, are reflective also of the subgroup of participants who completed all waves.

### **Qualitative Data Collection**

Three sets of annual focus groups were conducted in 2003, 2004, and 2005. The purpose of the focus groups was fourfold: (1) to clarify responses from the surveys (assessment); (2) to identify and explore issues not directly addressed in the surveys (data collection); (3) to contextually validate the findings of the quantitative model; and (4) to formulate new research questions for further study (problem identification) (Morgan, 1998). Focus groups are guided group discussions that enable researchers to develop both a context and depth of understanding as well as a frame for interpretation. Because these are group discussions, participants listen to and build upon each other's ideas and comments providing a rich context of experiences and opinions from which to gain an understanding of the situation and issues under consideration (Stewart & Shamdasani, 1990). Focus groups are a powerful research method when attempting to understand complex behaviors and their underlying motivations. As Morgan (1998) notes: the group discussions in focus groups allow you to hear the questions that the participants want to ask each other, this is especially useful for topics where people are not in touch with or able to articulate their motivations, feelings, and opinions. For this reason, focus groups were seen as critical to understanding sustained work by older farmers.

Initial focus groups convened after the first survey wave results were examined. Participants for the groups were purposively sampled from survey responses and by geographic location (Lincoln & Guba, 1985). Questions for group discussions were framed from the survey results. The initial round questions focused on health and types of work. The second wave of focus groups more fully explored the concepts of meaning of work, mental health, attachment to the land, and the effects of technology and economy on the decision to remain in farm work. The final wave of focus groups explored persistence of work, perspectives on health, and verified the model of sustained work that was generated from the quantitative analysis.

### **Qualitative Analyses**

While there are several approaches to the analysis of focus group discussions, the use of flip chart analysis was used in this study. Flip chart analysis provides for instant correction, clarification and verification of the data during the focus group. The moderator used flip charts to record "data bits", that is, verbatim notes of participant's statements. This allowed group consensus to be established during the meeting, an outcome not possible with recorded interviews. At the end of the focus group the moderator led the group in identifying the most salient themes from the discussion. In addition to the instant analysis, field notes taken by the assistant moderator were used to confirm and/or modify this analysis. Following each discussion, the moderator and assistant moderator reviewed the field notes and shared their impressions of the tone and content of the discussion. Notes from this debriefing supplemented the field notes and were especially valuable because they captured first impressions of the ways in which the discussion unfolded (Krueger, 1994).

## Other Analyses

Comparative analyses on health conditions and selected farm tasks were conducted for the subset of respondents who also participated in the KFFHHSP. In addition, full descriptive analyses were run for each of the four subgroups (White males, African-American males, White females, and African-American females) and farm couples enrolled in the Sustained Work Indicators study.

## Results

### Survey Response

Overall response to the survey surpassed our projections, with a 43% response to the first wave of data collection. The overall attrition for waves 1 - 4 was only 32.5%. Reasons for attrition were death (25), stated refusals (243), and unable to contact participant or nonresponses from those enrolled in the study (195). Reasons stated for refusals included just did not want to participate, retired or no longer farming, and not paid for previous surveys completed (all payments were tracked and all had received payment). Table 3 summarizes sample progression.

Table 3: Dispositions by wave

Survey Wave	ONE	TWO	THREE	FOUR	FIVE*
Date	Sept 2002- March 2003	Oct 2003- March 2004	June-August 2004	Feb-April 2005	April-May 2006
Number contacted	3315	1415	1239	1181	842
Number completed/usable	1423	1119	992	960	616
Response rate**	42.9%	79.1%	80.1%	81.3%	73.2%
Attrition from previous wave***	-----	21.4%	11.3%	3.2%	-----

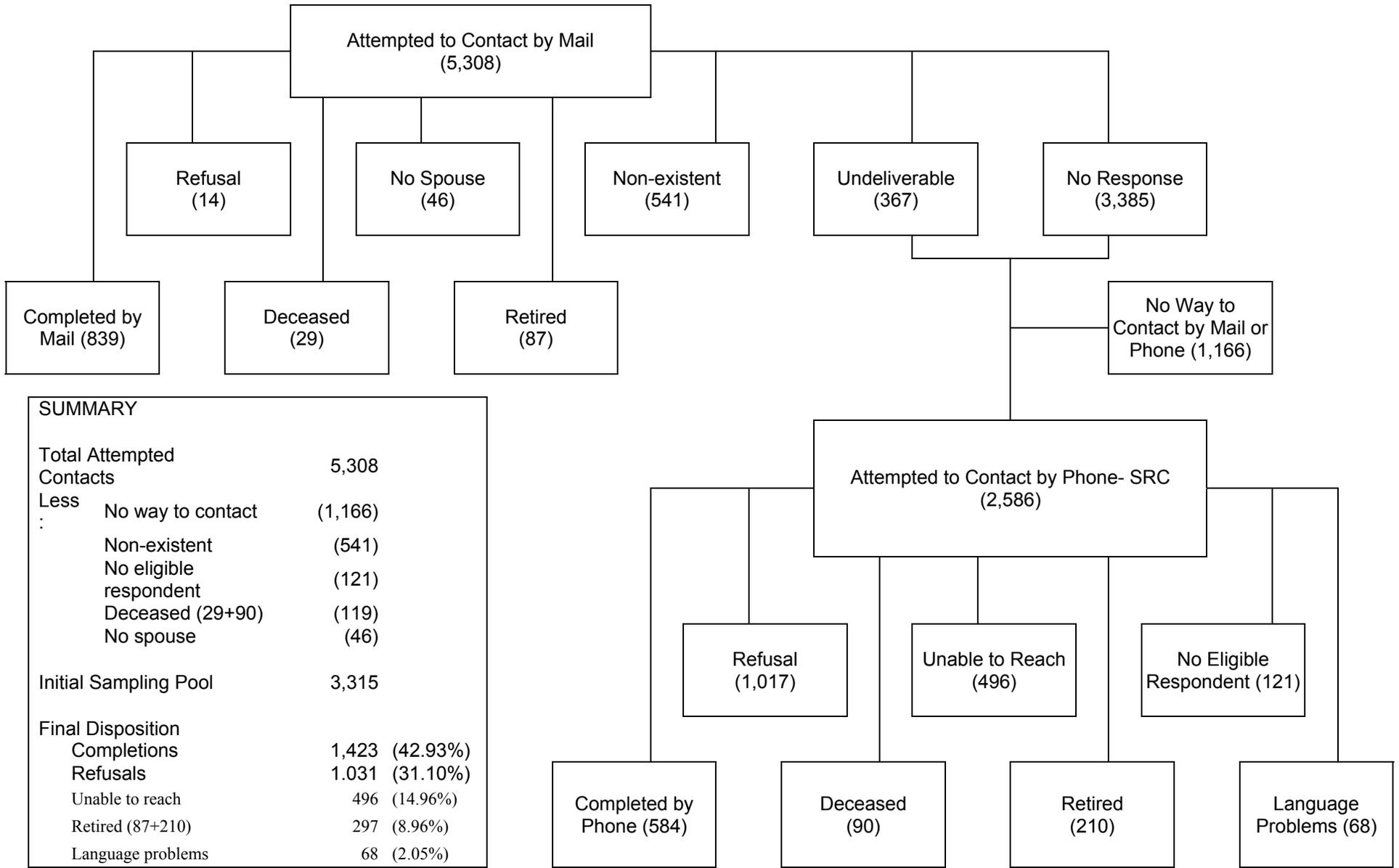
\*Treated as separate data, not included in attrition of larger study

\*\*Response rate based on number of completions divided by the number contacted

\*\*\*Attrition rate based on difference between number completed from wave to wave divided by previous wave's completion

The biggest challenge in administering the surveys was the initial mailing list. We were assuming that the bulk of the KFFHHSP mailing list would still be farming and in place. The initial and follow-up mailing in Wave One contained two surveys: one for the primary farmer and one for the spouse (we assumed there would be a spouse in each household). We also placed substantial effort into the recruitment of African-American farmers in Kentucky and South Carolina in order to boost participation. The 42% response rate was slightly better than predicted in our proposal, however, the number of African-American participants was lower than anticipated despite our intensive efforts. The move to a combination of mail and telephone surveys was extremely helpful in retaining participation. The University of Kentucky required that each participant complete W2 paperwork before payment could be made. This meant that the participant had to provide his/her social security number and that the income was reportable to the Internal Revenue Service. Some of the initial participants dropped out of the study because of this requirement. Figure 2 illustrates the tracking procedure used for each wave of the study.

Figure 2. Baseline enrollment tracking (illustrates the tracking of the initial sampling list that generated the baseline enrollment of 1423 participants)



Initially, if the person did not complete the survey because s/he claimed to be retired we decided to not pursue his/her completion of subsequent surveys. However, wave four contained several items pertaining to retirement and we felt it would be beneficial to try to regain those retirees. Through vigorous recruitment we managed to increase the number of retired farmers in that wave.

In waves 2 through 4, participants were given the choice of either completing the survey by phone or by mail. Individuals were first contacted by phone via the SRC to complete the survey. If they could not be reached by phone after several attempts, or if they indicated a preference for a mail survey for any reason (such as hearing or language problems), a hard copy survey was sent, and their names were removed from the phone survey list for all future waves. This was especially helpful in enrolling and retaining persons with hearing impairments and language issues. Wave 5 was conducted exclusively via mail surveys. No second mailings were used in Wave 5. The surveys were spaced to capture the seasonal variation of farming tasks. In each wave, the mail surveys were reviewed for completeness, and follow-up phone calls were made to clarify or complete participant responses.

*Wave 1.* Mail surveys were sent to the initial sampling pool of 3,315. Of that number, 839 were completed and returned. Follow-up surveys were conducted by phone resulting in an additional 584 completions. Participants were paid \$5 for completing the survey. Data collection took place between September 2002 and March 2003.

*Wave 2.* 1,415 individuals were contacted by the SRC. As requested by participants, follow-up mail surveys were sent. 996 surveys were completed by phone; 123 surveys were completed by mail. Participants were paid \$15 for completing the survey. Data collection took place between October 2003 and March 2004.

*Wave 3.* 1,055 individuals were contacted by the SRC. 184 individuals were mailed surveys based on preferences from previous wave; follow-up surveys were also mailed based on participant requests via the SRC. In the end, 853 surveys were completed by phone and 139 by mail. Participants were paid \$20 for completing the survey. Data collection took place between June and August 2004.

*Wave 4.* 870 individuals were contacted by the SRC; 311 surveys were mailed initially. Also, special phone calls were made by the research team to 27 farmers who had previously indicated they were retired. 719 individuals completed the phone survey with the SRC; 231 individuals returned the mail survey (including 3 retired individuals who requested a mail survey when contacted by phone); and 10 retired individuals completed the phone survey with the research team. Participants were paid \$25 for completing the survey. Data collection took place between February and April 2005.

*Wave 5.* The final wave of surveys was conducted exclusively by mail. 842 surveys were sent; 616 completed surveys were returned. This was a much greater response rate than expected. In this wave, one survey was sent to each household, rather than each individual. The main purpose of this survey was to learn about farmer reactions and opinions regarding the government tobacco buyout program. The survey was sent to all households in the cohort, including those who did not grow tobacco. Participants were paid \$40 for completing the survey. Data collection took place between April and May 2006.

### **Older Farmer Focus Groups**

Three rounds of focus groups were held in each state (Kentucky and South Carolina) during the course of the study. A total of 19 focus groups were conducted with 127 participants attending. All participants were selected from the roster of persons who completed the Wave One Survey. Participants were paid \$25. Kentucky participants were predominantly White (89%) while the South Carolina cohort was mostly Black (96%). Overall, the composition was 57% White, 36% Black. With regard to gender, there

were slightly more men than women (51% vs. 46%, respectively). Some individuals participated in more than one focus group (3 in Kentucky, 11 in South Carolina). The participants also reflected 26 couples from Kentucky and 9 couples from South Carolina. Table 4 outlines the focus group participation by gender and race.

Table 4. Focus group participants by gender and race

	# of Focus Groups	Male	Female	Unknown	TOTAL	White	Black	Other/Unknown
<i>Kentucky</i>								
Round 1	3	9	11	3	<b>23</b>	16	2	5
Round 2	2	10	10		<b>20</b>	19		1
Round 3	5	21	17		<b>38</b>	37		1
Total	10	40 (49.38%)	38 (46.92%)	3 (3.70%)	<b>81</b>	72 (88.89%)	2 (2.47%)	7 (8.64%)
<i>South Carolina</i>								
Round 1	3	5	5		<b>10</b>		10	
Round 2	3	10	10		<b>20</b>		18	2
Round 3	3	10	6		<b>16</b>		16	
Total	9	25 (54.35%)	21 (45.65%)		<b>46</b>		44 (95.65%)	2 (4.35%)
<b>TOTALS</b>	<b>19</b>	<b>65</b> (51.18%)	<b>59</b> (46.46%)	<b>3</b> (2.36%)	<b>127</b>	<b>72</b> (56.69%)	<b>46</b> (36.22%)	<b>9</b> (7.09%)

### Sample Characteristics

At baseline, the participants had an average age of 64.6 (SD=8.1, range 50-89). About half were male (50.7%) and the majority (78.5%) were White. About one fifth (20.2%) were African American. Most farmers were currently married (91.0%) and, on average, had been married to their current spouses for about 40 years (range six months to 70 years). Over 2/3 of the sample had a high school education ( $\bar{X}$  = 12.2) and provided evidence that, as a group, older farmers have educational experiences in line with their peers in the general population. Participants reported an average of 31.7 (SD=14.0, range 0-88) years in farming.

The majority (88.8%) owned the farm by themselves or with their spouse, about two thirds (63.3%) had income \$40,000 or lower, with an average of 28.2% income (SD=28.2 range 0-100) from farming. About 9% of farmers refused to provide information about their household incomes. Farm income accounted for approximately 28% of farmers' total yearly income, a figure that underscores the large numbers of farmers using off-farm employment as an economic strategy. In this sample, 43% had worked in an off-farm job in the past 12 months. Table 5 illustrates characteristics of the respondents.

Table 5. Characteristics of the farm respondents and the farm operation by age grouping (expressed as percents)

<b>Characteristics of the farm respondents and the farm operation</b>	<b>Under 65 N=749</b>	<b>65 - 69 N=267</b>	<b>70+ N=407</b>	<b>Total Sample N=1,423</b>
<b>Age</b>				
Under 65	---	---	---	<b>52.6</b>
65 - 69	---	---	---	<b>18.8</b>
70+	---	---	---	<b>28.6</b>
<b>Gender</b>				
Male	44.5	52.8	61.7	<b>51.0</b>
Female	55.5	47.1	38.3	<b>49.0</b>
<b>Role in the farm operation</b>				
Own it by yourself or with your spouse	86.9	92.1	90.0	<b>88.8</b>
Own it in partnership with some other relative	7.5	4.6	5.5	<b>6.4</b>
Own it in partnership with someone not a relative	0.1	0.0	0.0	<b>0.1</b>
Tenant farm	1.8	0.8	0.8	<b>1.3</b>
Only work on the farm	1.5	0.4	0.5	<b>1.0</b>
Only live on the farm	2.2	2.3	3.2	<b>2.5</b>
<b>Farm type</b>				
Livestock	3.5	3.9	4.5	<b>3.9</b>
Crops	32.6	36.5	32.7	<b>33.4</b>
Both	63.9	59.6	62.8	<b>62.8</b>

#### *Demographic distribution at each of the four waves*

The race, gender and age cohort (i.e., the age cohort the subject started the study in) distribution were compared over time to see if there was a differential loss rate for any subgroups of subjects. This analysis was conducted using the chi-square test of association, and for all three demographic variables, the relative percentage in each of the levels of the demographic characteristic was stable over time, with none of the chi-square tests detecting any distribution differences by wave of data collection.

#### *Ethnicity/race distribution*

As shown in Figure 3, the percentage of Black participants was stable over time, ranging from 18-20% during the 4 waves of data collection. Nearly all of the remaining participants were White, with less than 1% of the sample categorized as 'Other' racial category at each wave.

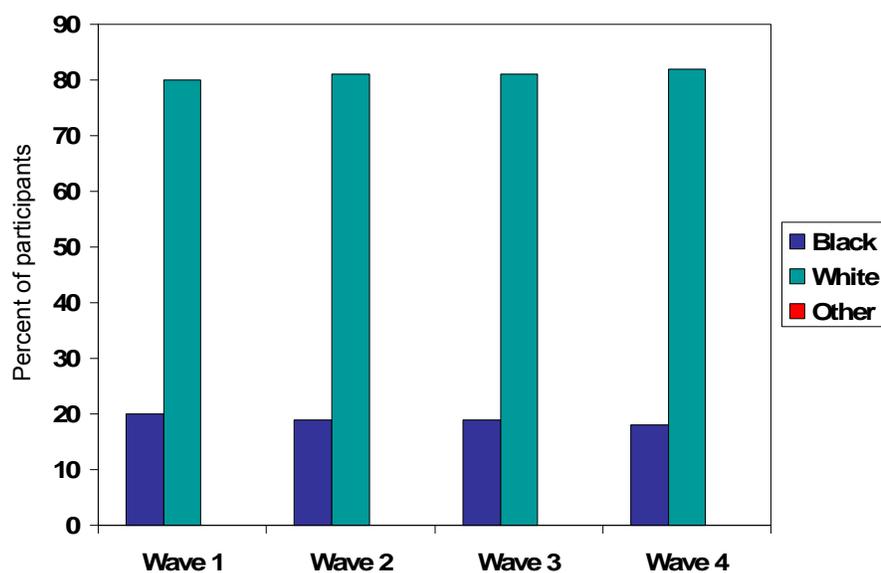


Figure 3. Percentage of respondents by race in each category at each wave.

### *Gender distribution*

As shown in Figure 4, the percentage of males and females was approximately equal and remained stable over time. The percentage of females ranged from 48-49% across the four waves.

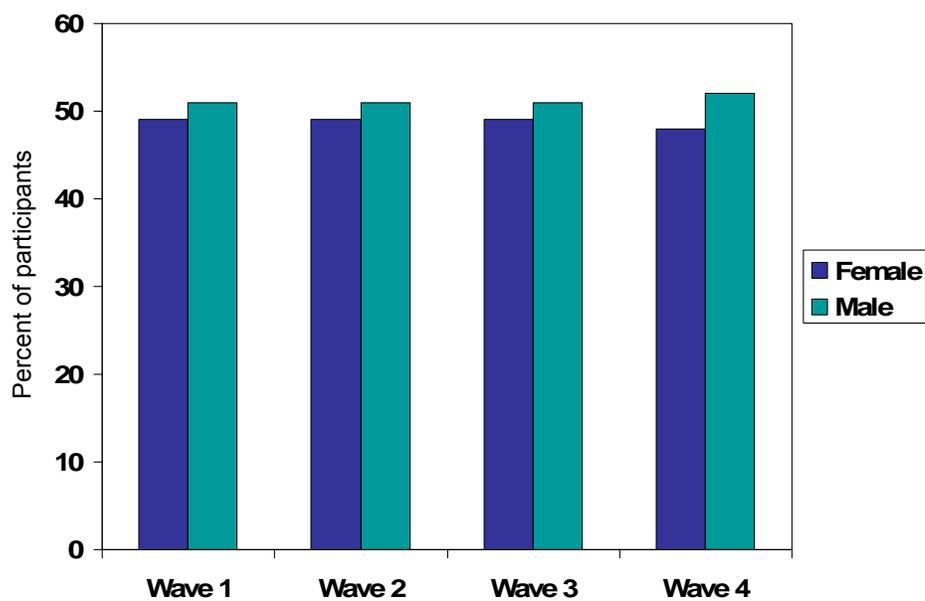


Figure 4. Percentage of respondents by gender in each category at each wave.

### Age distribution

Figure 5 displays the percentage of participants at each wave that were part of the age cohorts established at baseline. These percentages were stable as well, with those in the 50-59 cohort making up 28-30% of the sample at each of the 4 waves; those in the 60-69 cohort making up 41-44% of the sample at each of the 4 waves; those in the 70-79 cohort making up 25-26% of the sample across the 4 waves; and those in the 80-89 cohort making up 2-3% of the sample at each of the 4 waves.

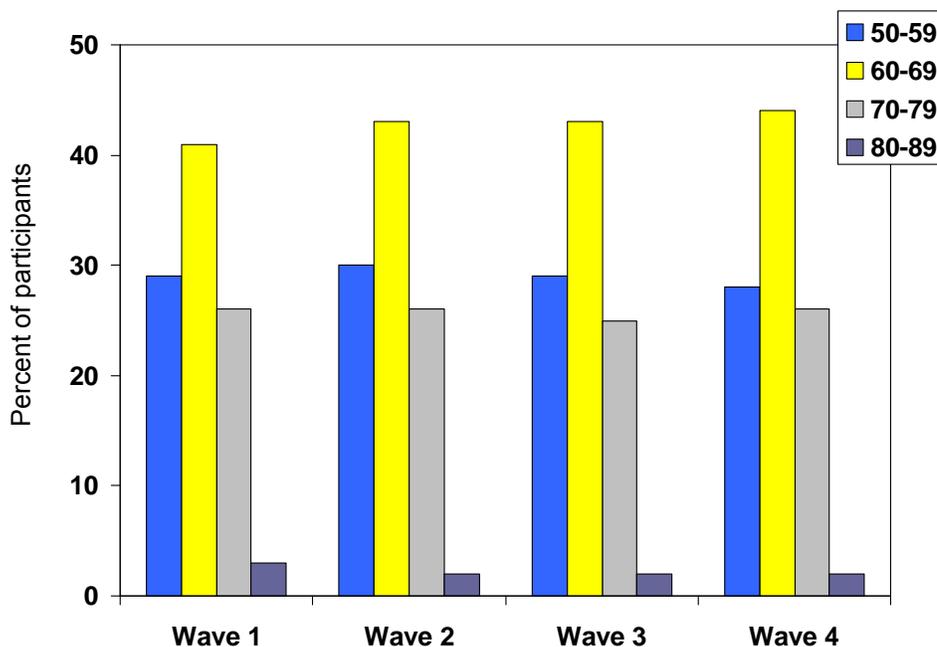


Figure 5. Percentage of respondents by age in each category at each wave.

### Specific Aim #1

*Develop health profiles (including physical and mental indicators) of older male and female farmers.*

### Physical Health Indicators

#### Definition of Health

In order to better understand what is meant when the participant responds to queries about his/her health it is important to understand what the term “health” means to the respondent. How a person defines “good health” is linked to one’s culture, personal life experiences, family, and environmental context. Historically, rural residents identify health as the ability to work, rather than the absence of taking medication or not having pain or disease (Armer & Radina, 2002; Long and Weinert, 1989; Sellers, Poduska, Propp and White, 1999). This characterization has been questioned as the rural culture diversified. The definition of health specific to the rural farm population had not yet been examined in large samples. The objectives of this analysis were to elucidate the definition of good health in this

sample and to identify both correlates and predictors of this definition of good health among elder farm residents.

Hypothesis: Senior farm residents with a greater ability to perform farm work (as measured by self-reported number of tasks performed) will be more likely to define good health as the ability to work, compared with seniors who report fewer number of tasks performed.

The data are from the baseline survey. Respondents were grouped by whether they defined health as ability to work versus absence of pain, disease, not having to take medication, or some other definition supplied by the respondent. Bivariate analysis consisted of t-tests, Wilcoxon tests, and chi-square tests. Predictors of health definition were determined using logistic regression. Model fit of the logistic regression was assessed with the Hosmer-Lemeshow goodness-of-fit test (Figure 6).

Forty percent of the participants characterized health as the ability to work, compared with the remaining 58% who chose lack of physical distress (i.e., no pain, disease or medications) (Figure 7). This binary health definition was unrelated to age, race, gender, education, state of residence, number of health conditions, or number of injuries. There were associations between health definition and number of farm tasks completed in the past year, hours spent doing farm work in the past week, and satisfaction with farm work. The number of farm tasks in the past year was larger for those choosing work ability as health definition (Wilcoxon  $p = .0008$ ). Among those defining health as work ability, 91% reported receiving at least some satisfaction from farm work, compared to 87% of those defining health as lack of physical distress ( $\chi^2 = 5.1$ ;  $p = .02$ ).

Controlling for age, race, gender, and education, the number of farm tasks completed in the past year was a significant predictor of health definition ( $p = .04$ ), with greater odds of choosing ‘ability to work’ as the definition with increasing number of farm tasks performed. The number of hours doing farm work in past week and farm work satisfaction did not predict health definition. For every 5-unit increase in the number of farm tasks performed in the past year, the odds of choosing work ability as health definition increased by 19%.

The Hosmer-Lemeshow goodness of fit test indicated the model fit the data well ( $p = .5$ ).

Predictor	Estimate	Std error	Odds ratio
Age	.012	.0089	1.01
White	.29	.17	1.34
Female	.13	.17	1.14
Yrs education	.018	.022	1.02
# Tasks in past yr	.035	.017	1.04*
Hrs farm work in past wk	.0061	.0046	1.01
Satisfaction with farm work	.039	.27	1.04

Figure 6. Logistic regression model: Predictors of binary health definition

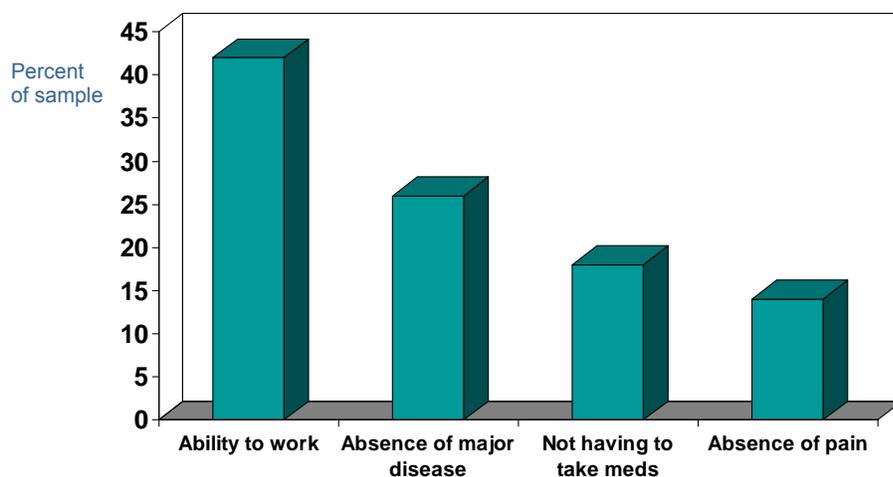


Figure 7. Definition of health

These quantitative results were confirmed in the first two waves of the focus groups (n=73 participants). Participants were not asked their definitions of health but they were asked about their participation in farm work and possible retirement. Responses to this subject were framed in terms of work and its relationship to health. Examples are provided below:

- “I can’t think of a time I wouldn’t be raising cows unless I was dead or disabled.”
- “We don’t really want to be retired because, truth is, you haven’t got long [to live].”
- “As long as I can climb onto a tractor I will. If you stop, you set still and die.”

### Self-rated Health

Respondents were asked to rate their health using the National Health Interview Survey question: “How would you rate your health in general? Excellent, Very good, Good, Fair, Poor.” At baseline, one third of the sample rated their general health as “excellent” or “very good.” The proportion reaching this evaluation declined with age. However, one third of the total sample stated that their health was “good” and this did not vary with age.

Older subjects were more likely to report being in poor health ( $r=-0.24$ ,  $p<.0001$ ). The number of health conditions exhibited an inverse relationship with self-reported health status ( $r=-0.49$ ,  $p<.0001$ ). This did not vary over time.

### Health Problems

A checklist of 18 potential health problems was included as part of the survey at baseline, Wave 3, and Wave 4. The checklist included such things as heart problems, stroke, high blood pressure, diabetes, cancer, and hearing and vision problems. A summary score was created for this instrument by determining the number of health problems indicated, with potential scores ranging from 0-18.

#### *Health Problems at Baseline*

The average number of health problems reported by the participants at baseline was 3.2 (SD = 2.2), with a range from 0-13. The number of health conditions at baseline increased with age (from 2.5 (SD=2.0) in

the age 50-59 cohort to 4.7 (SD=2.6) in the 80 and above group). Male farmers had significantly more health conditions than females in the study (Male: Mean=3.4, SD=2.3; Female: Mean=3.0, SD=2.0;  $t=4.1$   $p<.0001$ ). White male farmers had significantly greater number of problems (Mean=3.6) compared with Black males (Mean=2.8;  $p<.0001$ ) and White females (Mean=3.0;  $p<.0001$ ). The number of health conditions at baseline did not differ significantly between Black males and Black females (Mean=2.8;  $p=.9$ ) or between Black and White females ( $p=.3$ ).

There were differences among the race/gender combinations and also by age cohort. As shown in Figure 8 the number of health conditions at baseline was higher for White participants compared with older farmers who were Black, and this was true for both men and women. The analysis of variance (ANOVA) F test comparing these four groups on average number of health problems was significant ( $F = 12.7$ ,  $p < .0001$ ), and post hoc pairwise comparisons were made using Fisher's least significance procedure. The post hoc analysis indicated that White men listed significantly more health problems than each of the other race/gender subgroups ( $p < .0001$  for each comparison), while there were no other differences among the remaining 3 race/gender subgroups.

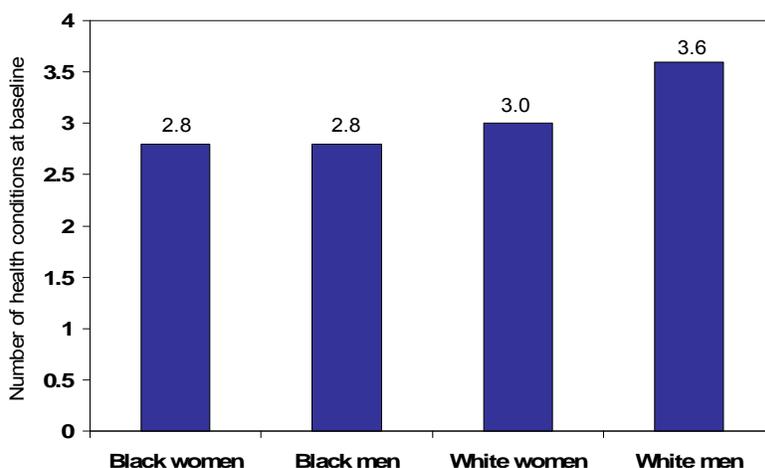


Figure 8. Average number of health conditions by race/gender

As shown in Figure 9, the number of reported health conditions increased with increasing age cohort. The F-value for the one-way ANOVA model was significant ( $F = 41.5$ ,  $p < .0001$ ), and the post hoc analysis revealed each pairwise comparison was significant. In particular, the comparison of age 70-79 to age 80-89 was least significant, with  $p = .04$ , while the remaining pairwise comparisons were significant at the .0001 level.

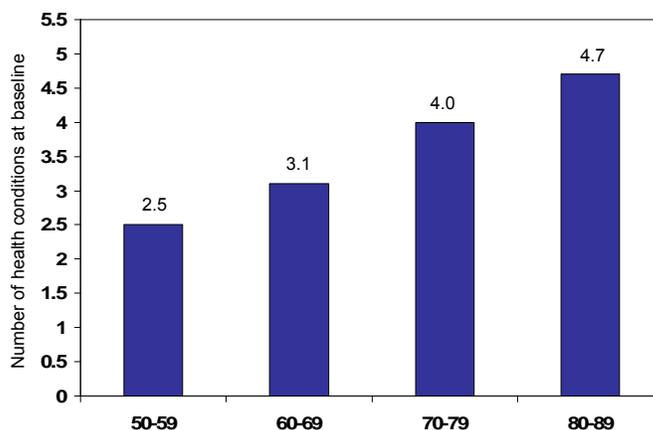
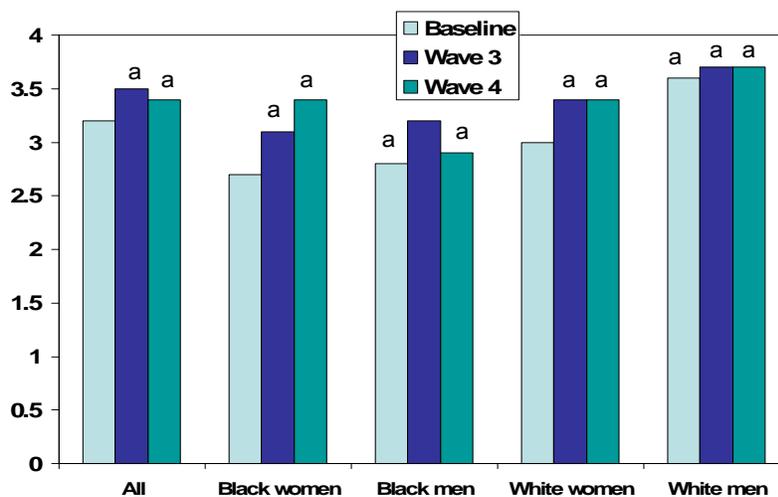


Figure 9. Average number of health conditions by age cohort

### *Change in Health Problems over Time*

The total number of health conditions was assessed at baseline and then again at the 3<sup>rd</sup> and 4<sup>th</sup> waves of data collection. Repeated measures ANOVA modeling was used to determine whether the change in number of health problems there was significant; post hoc analysis was conducted using Fisher's least significant difference procedure. Repeated measures ANOVA modeling also was used to test the significance of the interaction between time (3 waves) and race/gender group (4 levels) in the first longitudinal model and between time (3 waves) and age cohort (4 levels) in the second longitudinal model below. Fisher's least significant difference procedure was the post hoc test used to determine pairwise differences for significant effects and interactions.

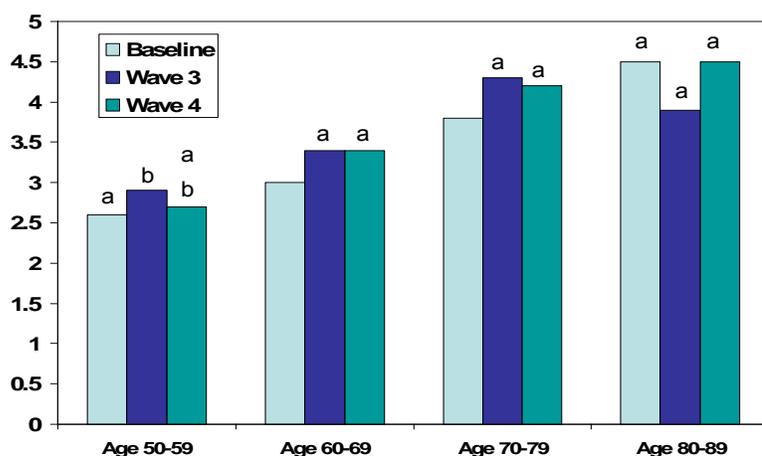
As shown in Figure 10 below, there was some variability in average health problems scores over time and among the race/gender subgroups. The interaction between time (wave) and race/gender group was significant ( $F = 3.4, p = .003$ ), so the post hoc analysis is focused on this interaction effect. For the entire sample of older farmers, there was a trend toward an increasing number of health problems over time, with a significant increase from Baseline to Wave 3 that was maintained at the Wave 4 interview (i.e., the difference between Wave 3 and Wave 4 in average health problems was not significant). For the individual race/gender groups, there were differences in the trajectory of health problems over time. Black women demonstrated an increase between Wave 1 and Wave 3 that was maintained at Wave 4. Black men had a somewhat more stable profile, with a larger number of health problems reported at Wave 3 compared to the other two waves, but the change between Baseline and Wave 4 was not significant. White women had a profile similar to Black women, with an increase in health problems between baseline and Wave 3, but with no significant change between Wave 3 and Wave 4. Finally, White men exhibited the highest average number of health problems, with scores that were relatively stable over time: there were no differences among the three timepoints in health problem scores for this race/gender subgroup.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 10. Average number of health problems over time, for the entire sample and by race/gender category.

There were some differences among the age cohort subgroups, and the cohorts exhibited different trajectories of average number of health problems over time (see Figure 11). Consistent with the Baseline comparison among age cohort groups, there was an increasing trend in health problems for the older age cohorts. Among those 50-59 at Baseline, the number of health problems over time was relatively stable: the only significant difference was an increase from Baseline to Wave 3, but there was no difference between Baseline and Wave 4 or between Waves 3 and 4. For the 60-69 group, there was an increase in mean health problems from Baseline to Wave 3 and this was maintained (but not increased) at Wave 4. This same pattern was demonstrated in the 70-79 cohort, with an increase from Baseline to Wave 3 that was maintained at Wave 4. Finally, though the means for the 80-89 cohort appear to change somewhat over time, the differences among the timepoints were not significant for this group.



Note: Means with the same letter within each group are not significantly different at  $\alpha=.05$ .

Figure 11. Average number of health problems over time, by age cohort at Baseline

### Dominant Health Conditions and Impact on Ability to Farm

Arthritis, high blood pressure, hearing problems, vision problems/cataracts, and back problems were the most dominant health conditions reported by all age groups and sample cohorts across all waves. However, diabetes was also a primary health condition for the Black cohort (both male and female) while prostate problems, heart, and skin cancer affected the White male cohort. Nearly one-fifth of the Black male cohort also reported prostate problems.

Back problems, arthritis, and heart problems had the greatest impact on the participants' ability to farm across all waves (57.0% - 79.5%). Diabetes impacted over a third of the respondents' ability (36.5%-43.3%). Prostate, hearing, vision, and high blood pressure were reported as having significant impact in Wave 1 but decreased across time. Of the dominant health conditions reported, skin cancer had the least impact on the farmers' ability to conduct their farm tasks. The charts and tables presented below reflect the self-reported health conditions of the older farmer participants by each wave. The information is presented first for the overall sample, followed by breakdowns of health conditions for the various sample cohorts (i.e., gender, race, and age).

When the participant reported a health condition a follow up question asked how much that health condition limited their ability to do farm work: "None, a little or a lot". This provided a better vision of the severity of the health condition and insight into the impact of the health condition on the farmer's ability to continue his/her work. Contrary to expectations, the severity did not increase over time, but rather remained steady or declined slightly (see Table 9). This may be due to the attrition of older and more frail individuals dropping out of the study. This will be investigated further.

Table 6. Top 5 health conditions by age groups (expressed in percentages)

	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
Wave 1	53.3 Arthritis 50.7 High blood pressure 31.7 Back problems 25.5 Hearing problems 23.7 Vision (not cataracts)	43.0 High blood pressure 42.7 Arthritis 34.1 Back problems 30.1 Vision (not cataracts) 19.5 Hearing problems	54.8 Arthritis 52.2 High blood pressure 29.9 Back problems 21.6 Vision (not cataracts) 21.4 Hearing problems	62.7 Arthritis 56.6 High blood pressure 38.1 Hearing problem 32.6 Back problems 32.6 Cataracts	66.7 Arthritis 55.6 High blood pressure 51.1 Cataracts 46.7 Hearing problems 40.0 Vision (not cataracts)
Wave 3	54.8 Arthritis 54.6 High blood pressure 33.8 Back problems 28.0 Hearing problems 25.3 Vision (not cataracts)	51.1 High blood pressure 46.1 Arthritis 35.5 Back problems 26.6 Vision (not cataracts) 19.1 Hearing problems	56.7 Arthritis 55.3 High blood pressure 31.1 Back problems 25.8 Hearing problems 25.4 Vision (not cataracts)	59.5 Arthritis 58.3 High blood pressure 42.1 Cataracts 41.3 Hearing problems 36.0 Back problems	65.2 High blood pressure 60.9 Arthritis 56.5 Cataracts 43.5 Hearing problems 34.8 Back problems
Wave 4	55.4 High blood pressure 54.5 Arthritis 32.3 Back problems 26.4 Hearing problems 25.9 Cataracts	49.0 High blood pressure 46.7 Arthritis 34.5 Back problems 21.5 Vision (not cataracts) 18.0 Hearing problems	57.9 High blood pressure 55.0 Arthritis 29.6 Back problems 25.5 Cataracts 25.2 Hearing problems	60.2 High blood pressure 59.8 Arthritis 45.6 Cataracts 38.6 Hearing problems 33.6 Heart	66.7 Arthritis 61.1 High blood pressure 61.1 Cataracts 44.4 Hearing problems 38.9 Back problems

Table 7. Top 5 health conditions by sample cohorts (expressed in percentages)

	<b>Overall</b>	<b>White Female</b>	<b>Black Female</b>	<b>White Male</b>	<b>Black Male</b>
Wave 1	53.3 Arthritis 50.7 High blood pressure 31.7 Back problems 25.5 Hearing problems 23.7 Vision (not cataracts)	55.0 Arthritis 48.6 High blood pressure 30.1 Back problems 25.5 Vision (not cataracts) 18.8 Cataracts	68.1 High blood pressure 53.8 Arthritis 22.7 Cataracts 21.8 Diabetes 20.2 Vision (not cataracts) 20.2 Back problems	52.7 Arthritis 46.9 High blood pressure 45.2 Hearing problem 35.9 Back problems 26.4 Prostate problems	55.7 High blood pressure 47.9 Arthritis 29.9 Back problems 24.6 Vision (not cataracts) 22.8 Diabetes 18.0 Prostate problems
Wave 3	54.8 Arthritis 54.6 High blood pressure 33.8 Back problems 28.0 Hearing problems 25.3 Vision (not cataracts)	60.8 Arthritis 55.1 High blood pressure 34.9 Back problems 29.4 Vision (not cataracts) 26.4 Cataracts	71.2 High blood pressure 52.1 Arthritis 30.1 Cataracts 28.8 Back problems 27.4 Diabetes	49.6 Arthritis 48.1 Hearing problems 47.5 High blood pressure 32.3 Back problems 25.6 Heart 25.6 Skin cancer	63.3 High blood pressure 52.3 Arthritis 38.5 Back problems 29.4 Vision (not cataracts) 22.0 Diabetes 22.0 Hearing problems
Wave 4	55.4 High blood pressure 54.5 Arthritis 32.3 Back problems 26.4 Hearing problems 25.9 Cataracts	57.4 Arthritis 55.9 High blood pressure 29.7 Back problems 28.2 Cataracts 19.5 Vision (not cataracts)	75.0 High blood pressure 59.4 Arthritis 35.9 Back problems 31.3 Diabetes 25.0 Cataracts	50.9 High blood pressure 50.1 Arthritis 44.9 Hearing problems 35.7 Back problems 30.7 Heart	55.1 High blood pressure 53.3 Arthritis 25.2 Back problems 24.3 Vision (not cataracts) 22.4 Diabetes

Table 8. Impact of dominant health conditions on ability to farm expressed as percentages – overall sample

Health Condition	Wave 1			Wave 3			Wave 4		
	Little	Lot	Total	Little	Lot	Total	Little	Lot	Total
Back problems	47.8	31.7	<b>79.5</b>	44.1	33.3	<b>77.4</b>	46.3	30.6	<b>76.9</b>
Arthritis	43.0	25.7	<b>68.7</b>	36.9	24.8	<b>61.7</b>	43.5	22.4	<b>65.9</b>
Heart	36.4	31.4	<b>67.8</b>	31.6	25.4	<b>57.0</b>	28.3	32.1	<b>60.4</b>
Diabetes	24.1	19.2	<b>43.3</b>	19.9	19.9	<b>39.8</b>	19.5	17.0	<b>36.5</b>
Prostate problems	27.8	9.3	<b>37.1</b>	16.3	2.9	<b>19.2</b>	*	*	*
Hearing problems	28.6	8.0	<b>36.6</b>	10.8	6.7	<b>17.5</b>	20.0	4.8	<b>24.8</b>
Vision (not cataracts)	23.2	8.2	<b>31.4</b>	15.2	6.0	<b>21.2</b>	16.6	5.5	<b>22.1</b>
High blood pressure	20.2	11.0	<b>31.2</b>	15.8	9.3	<b>25.1</b>	17.8	9.7	<b>27.5</b>
Cataracts	19.9	5.9	<b>25.8</b>	11.4	5.9	<b>17.3</b>	13.4	3.7	<b>13.4</b>
Skin cancer	10.8	2.5	<b>13.3</b>	8.1	1.5	<b>9.6</b>	5.0	1.7	<b>6.7</b>

Table 9. Health conditions across time expressed as percentages – overall sample

Health Condition	Wave 1	Wave 3	Wave 4
Arthritis	53.3	54.8	54.5
High blood pressure	50.7	54.6	55.4
Back problems	31.7	33.8	32.3
Hearing problem	25.5	28.0	26.4
Vision (not cataract)	23.7	25.3	21.1
Heart	18.2	19.8	22.4
Cataracts	17.9	24.4	25.9
Diabetes	15.4	15.7	17.0
Prostate problems	12.4	10.6	
Skin cancer	12.0	13.7	12.7
Chronic bronchitis/ emphysema	8.6	9.7	8.4
Carpal tunnel	8.1	9.0	9.4
Other cancer	8.0	8.9	9.6
Osteoporosis	7.7	9.5	9.8
Incontinence	7.1	6.0	8.6
Stroke	6.0	5.9	4.7
Broken hip	1.8	2.4	2.1

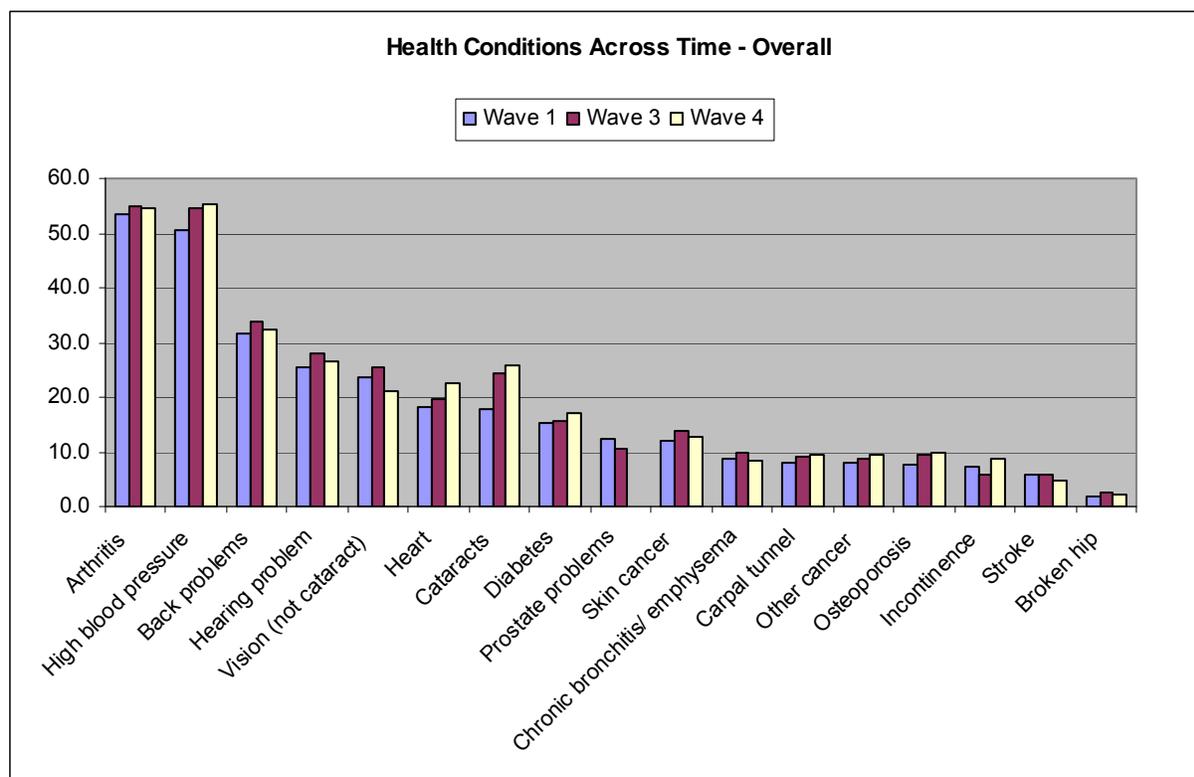


Figure 12. Health conditions across time - Overall

Table 10. Health conditions across time expressed as percentages – White females

Health Conditions - White Females	Wave 1	Wave 3	Wave 4
Arthritis	55.0	60.8	57.4
High blood pressure	48.6	55.1	55.9
Back problems	30.1	34.9	29.7
Vision (not cataracts)	25.5	29.4	19.5
Cataracts	18.8	26.4	28.2
Osteoporosis	14.9	18.5	18.5
Heart	14.0	16.2	18.2
Hearing problem	12.8	12.7	12.3
Carpal tunnel	12.6	12.7	12.8
Diabetes	10.8	11.0	11.8
Incontinence	9.4	5.7	10.5
Skin cancer	8.3	8.5	7.9
Other cancer	8.2	7.5	6.9
Chronic bronchitis or emphysema	6.9	9.5	8.2
Stroke	5.0	4.2	2.8
Broken hip	1.8	3.0	2.6
Dizziness or balance problems			11.5

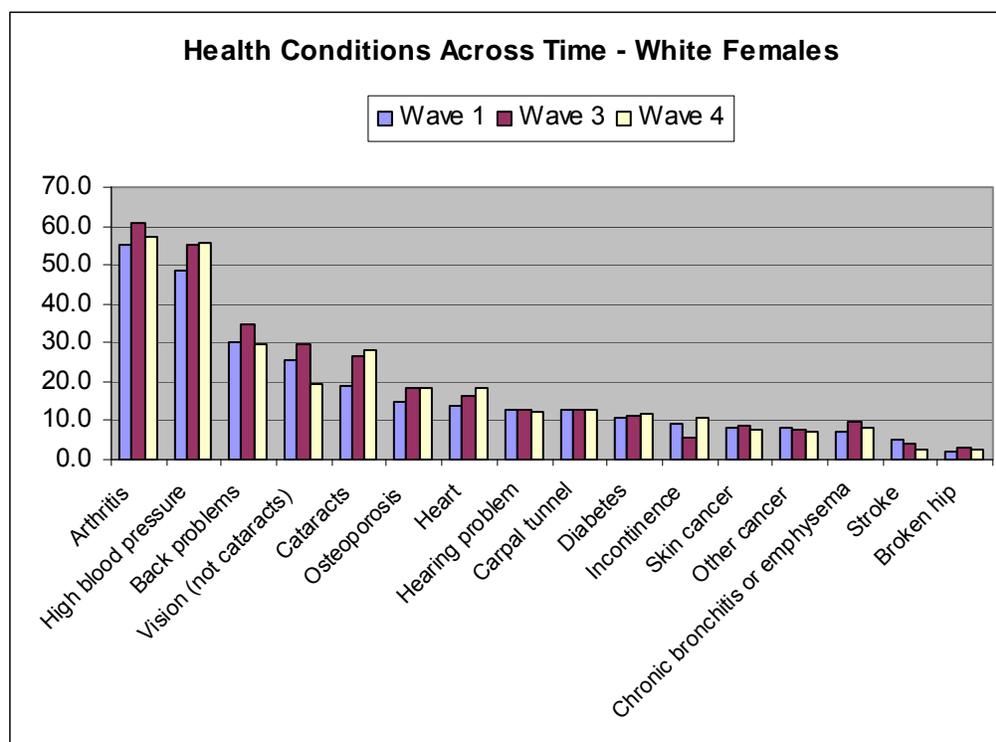


Figure 13. Health conditions across time – White females

Table 11. Health conditions across time expressed as percentages– Black females

<b>Health Conditions - Black Females</b>	<b>Wave 1</b>	<b>Wave 3</b>	<b>Wave 4</b>
High blood pressure	68.1	71.2	75.0
Arthritis	53.8	52.1	59.4
Cataracts	22.7	30.1	25.0
Diabetes	21.8	27.4	31.3
Vision (not cataracts)	20.2	23.3	21.9
Back problems	20.2	28.8	35.9
Heart	12.6	17.8	15.6
Hearing problem	10.1	11.0	12.5
Osteoporosis	10.1	12.3	9.4
Stroke	5.0	5.5	4.7
Carpal tunnel	5.0	6.8	9.4
Other cancer	5.0	6.8	4.7
Chronic bronchitis or emphysema	5.0	11.0	7.8
Incontinence	3.4	8.2	4.7
Broken hip	1.7	1.4	4.7
Skin cancer	0.8	0.0	0.0
Dizziness or balance problems			12.5

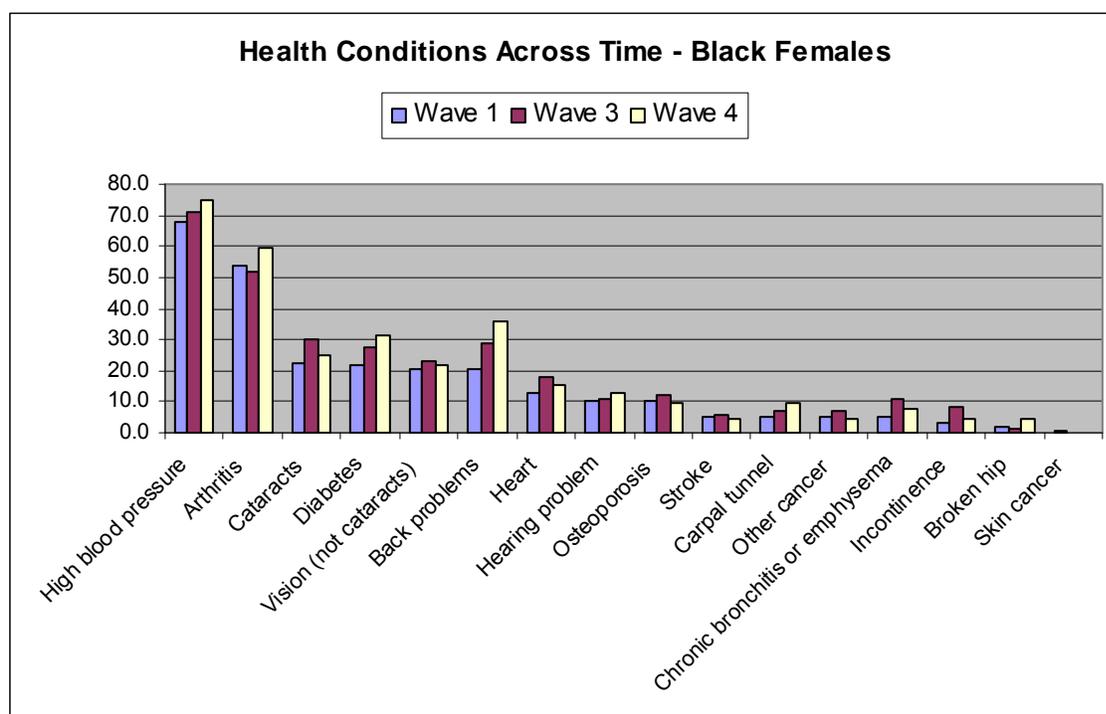


Figure 14. Health conditions across time – Black females

Table 12. Health conditions across time expressed as percentages– White males

Health Conditions - White Males	Wave 1	Wave 3	Wave 4
Arthritis	52.7	49.6	50.1
High blood pressure	46.9	47.5	50.9
Hearing problem	45.2	48.1	44.9
Back problems	35.9	32.3	35.7
Prostate problems	26.4	20.7	
Heart	24.7	25.6	30.7
Vision (not cataracts)	21.8	20.2	21.3
Skin cancer	21.8	25.6	23.4
Cataracts	17.9	23.3	25.5
Diabetes	16.1	16.3	18.1
Chronic bronchitis or emphysema	11.7	11.4	9.4
Other cancer	9.3	11.4	13.4
Stroke	7.3	7.5	6.3
Carpal tunnel	6.0	6.5	6.8
Incontinence	5.1	5.2	6.0
Broken hip	2.0	2.3	1.6
Osteoporosis	1.6	1.8	2.9
Dizziness or balance problems			12.9

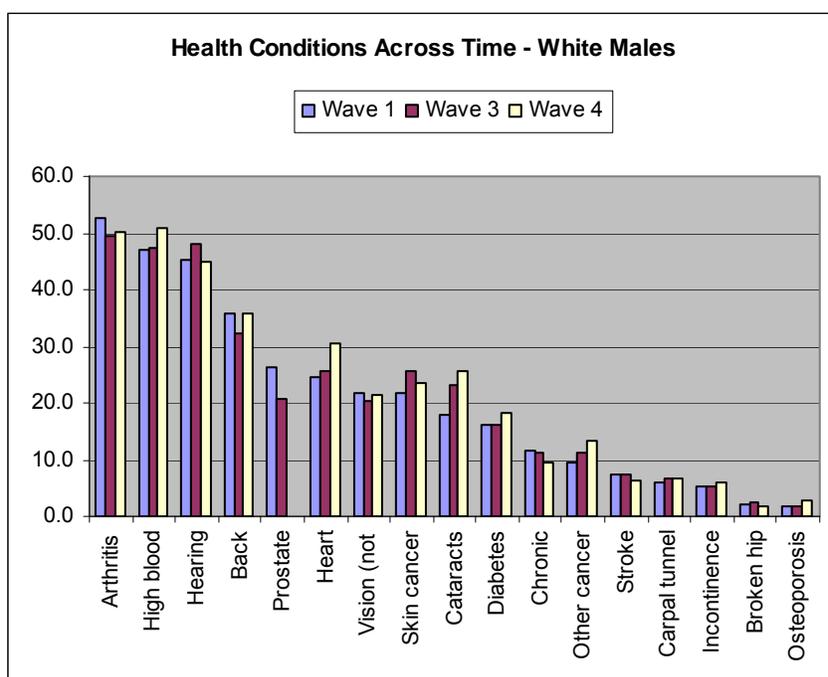


Figure 15. Health conditions across time – White males

Table 13. Health conditions across time expressed as percentages – Black males

Health Conditions - Black Males	Wave 1	Wave 3	Wave 4
High blood pressure	55.7	63.3	55.1
Arthritis	47.9	52.3	53.3
Back problems	29.9	38.5	25.2
Vision (not cataracts)	24.6	29.4	24.3
Diabetes	22.8	22.0	22.4
Prostate problems	18.0	21.1	
Heart	15.0	13.8	12.1
Hearing problem	14.4	22.0	19.6
Cataracts	10.8	18.3	18.7
Incontinence	8.4	7.3	11.2
Stroke	6.6	5.5	5.6
Other cancer	6.0	8.3	10.3
Chronic bronchitis or emphysema	4.8	3.7	4.7
Osteoporosis	1.8	1.8	2.8
Carpal tunnel	1.8	4.6	4.7
Broken hip	1.2	0.9	0.9
Skin cancer	0.6	0.9	0.0
Dizziness or balance problems			7.5

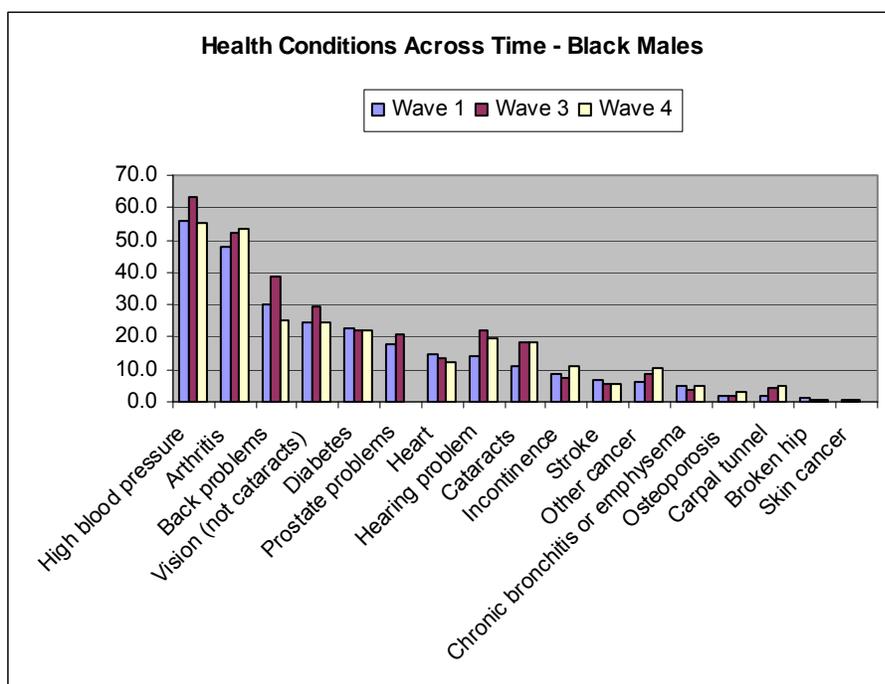


Figure 16. Health conditions across time – Black Males

The next series of tables reflects the health conditions by wave for the overall sample and age cohorts followed by the breakdown of health conditions reported by the various sample cohorts.

## Wave 1 Health Condition Results

Table 14. Health conditions overall and by age groups expressed as percentages – Wave 1

Health Condition	Overall	50-59	60-69	70-79	80-89
Arthritis	53.3	42.7	54.8	62.7	66.7
High blood pressure	50.7	43.0	52.2	56.6	55.6
Back problems	31.7	34.1	29.9	32.6	24.4
Hearing problem	25.5	19.5	21.4	38.1	46.7
Vision (not cataract)	23.7	30.1	21.6	18.8	40.0
Heart	18.2	9.1	15.8	30.7	28.9
Cataracts	17.9	5.7	15.5	32.6	51.1
Diabetes	15.4	9.6	16.9	19.1	22.2
Prostate problems	12.4	7.7	9.8	21.3	26.7
Skin cancer	12	7.7	11.8	18.2	8.9
Chronic bronchitis/ emphysema	8.6	6.2	9	10.8	6.7
Carpal tunnel	8.1	9.4	8.3	6.9	6.7
Other cancer	8	4.2	9.1	10.5	13.3
Osteoporosis	7.7	4.2	8.1	10.5	17.8
Incontinence	7.1	3.7	7.7	8	26.7
Stroke	6.0	2.0	4.0	13.3	8.9
Broken hip	1.8	0.7	1.2	2.8	11.1

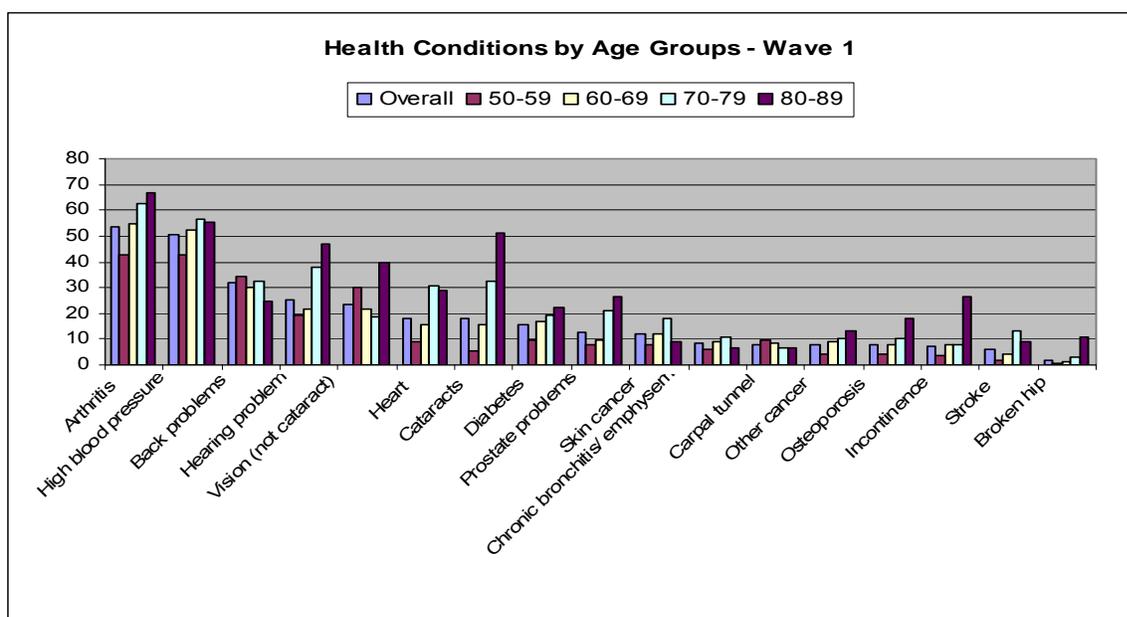


Figure 17. Health conditions by age groups – Wave 1

Table 15. Health conditions by sample cohorts expressed as percentages – Wave 1

<b>Health Conditions Wave 1</b>	<b>White Female</b>	<b>Black Female</b>	<b>White Male</b>	<b>Black Male</b>
Arthritis	55.0	53.8	52.7	47.9
High blood pressure	48.6	68.1	46.9	55.7
Hearing problem	12.8	10.1	45.2	14.4
Back problems	30.1	20.2	35.9	29.9
Prostate problems	0.0	0.0	26.4	18.0
Heart	14.0	12.6	24.7	15.0
Vision (not cataracts)	25.5	20.2	21.8	24.6
Skin cancer	8.3	0.8	21.8	0.6
Cataracts	18.8	22.7	17.9	10.8
Diabetes	10.8	21.8	16.1	22.8
Chronic bronchities/ emphysema	6.9	5.0	11.7	4.8
Other cancer	8.2	5.0	9.3	6.0
Stroke	5.0	5.0	7.3	6.6
Carpal tunnel	12.6	5.0	6.0	1.8
Incontinence	9.4	3.4	5.1	8.4
Broken hip	1.8	1.7	2.0	1.2
Osteoporosis	14.9	10.1	1.6	1.8

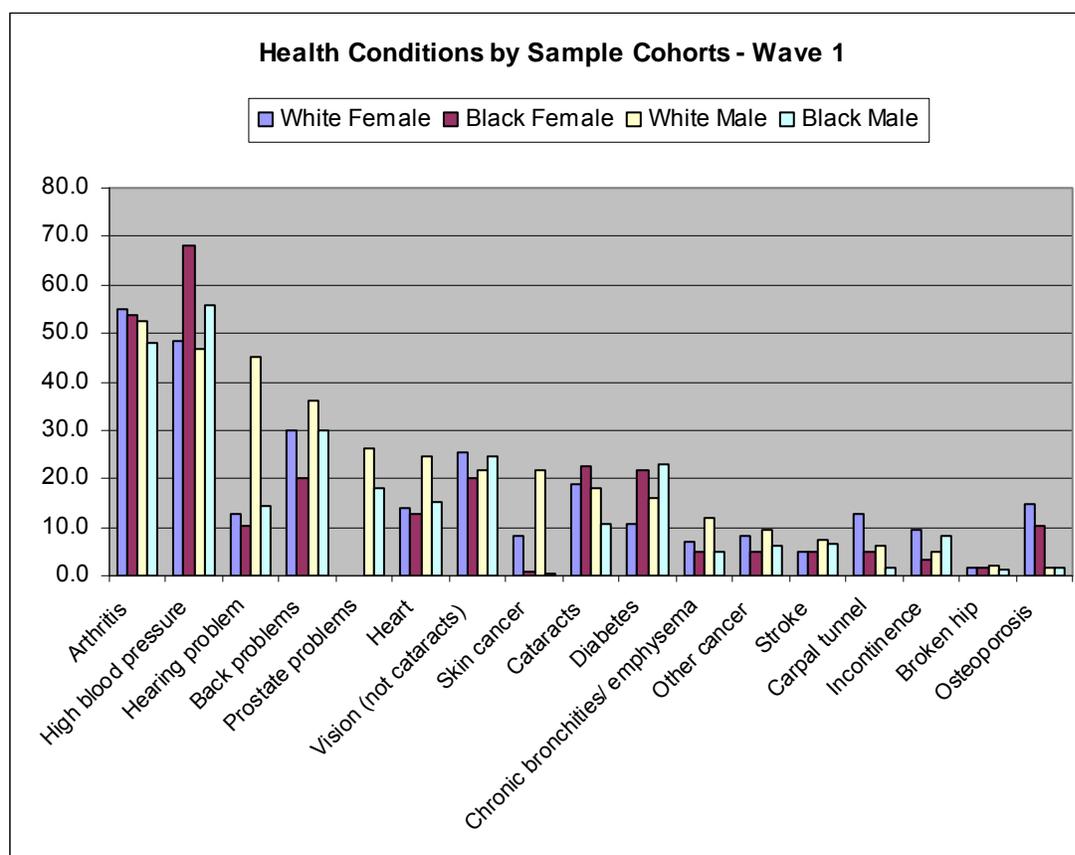


Figure 18. Health conditions by sample cohorts – Wave 1

Table 16. White female health conditions expressed as percentages – Wave 1

White Female Health Conditions	Overall	50-59	60-69	70-79	80-89
Arthritis	55.0	44.2	57.9	63.8	56.3
High blood pressure	48.6	43.0	50.4	56.0	43.8
Back problems	30.1	29.7	30.2	29.3	25.0
Vision (not cataracts)	25.5	33.1	21.5	19.0	50.0
Cataracts	18.8	3.5	17.8	42.2	50.0
Osteoporosis	14.9	5.2	15.3	26.7	37.5
Heart	14.0	6.4	12.0	27.6	25.0
Hearing problem	12.8	11.6	10.7	15.5	43.8
Carpal tunnel	12.6	15.7	12.8	8.6	6.3
Diabetes	10.8	8.1	9.9	16.4	18.8
Incontinence	9.4	4.7	10.7	8.6	50.0
Skin cancer	8.3	9.9	5.8	13.8	0.0
Other cancer	8.2	4.1	9.1	12.1	18.8
Chronic bronchitis/ emphysema	6.9	5.2	7.0	7.8	12.5
Stroke	5.0	0.6	5.0	11.2	12.5
Broken hip	1.8	1.2	1.2	2.6	12.5

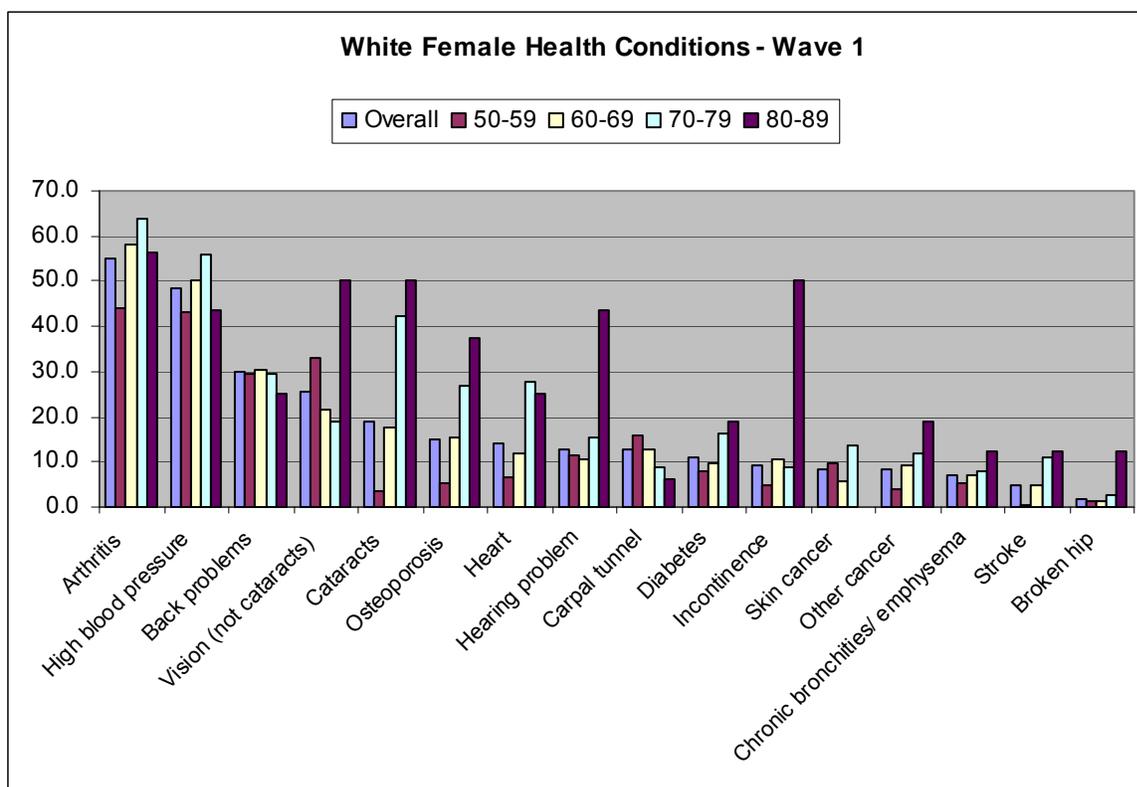


Figure 19. White female health conditions – Wave 1

Table 17. Black female health conditions expressed as percentages – Wave 1

<b>Black Female Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	68.1	66.7	68.1	70.6	100.0
Arthritis	53.8	38.5	63.8	76.5	75.0
Cataracts	22.7	2.6	27.7	58.8	50.0
Diabetes	21.8	17.9	27.7	29.4	0.0
Vision (not cataracts)	20.2	25.6	19.1	11.8	50.0
Back problems	20.2	28.2	12.8	23.5	25.0
Heart	12.6	7.7	14.9	5.9	50.0
Hearing problem	10.1	10.3	6.4	17.6	50.0
Osteoporosis	10.1	10.3	8.5	11.8	50.0
Stroke	5.0	5.1	4.3	5.9	0.0
Carpal tunnel	5.0	2.6	4.3	11.8	25.0
Other cancer	5.0	2.6	8.5	0.0	0.0
Chronic bronchitis/ emphysema	5.0	0.0	6.4	5.9	0.0
Incontinence	3.4	2.6	6.4	0.0	0.0
Broken hip	1.7	0.0	0.0	5.9	25.0
Skin cancer	0.8	0.0	0.0	5.9	0.0

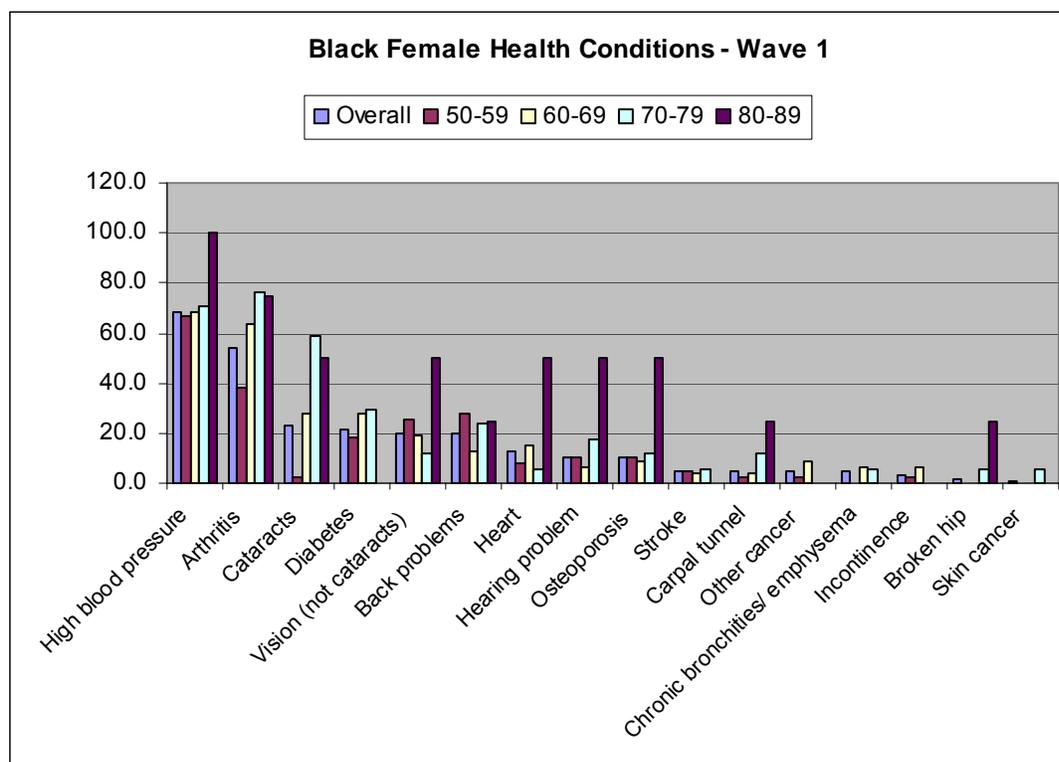


Figure 20. Black female health conditions – Wave 1

Table 18. White male health conditions expressed as percentages – Wave 1

White Male Health Conditions	Overall	50-59	60-69	70-79	80-89
Arthritis	52.7	42.6	49.8	61.2	90.9
High blood pressure	46.9	32.6	47.4	55.9	45.5
Hearing problem	45.2	38.0	39.1	56.4	63.6
Back problems	35.9	41.1	31.6	37.8	18.2
Prostate problems	26.4	15.5	23.7	35.6	54.5
Heart	24.7	10.1	22.3	36.7	27.3
Vision (not cataracts)	21.8	26.4	20.9	19.7	27.3
Skin cancer	21.8	9.3	24.7	25.5	36.4
Cataracts	17.9	10.1	10.7	28.2	72.7
Diabetes	16.1	6.2	20.0	17.0	36.4
Chronic bronchitis/ emphysema	11.7	9.3	12.1	13.8	0.0
Other cancer	9.3	5.4	10.2	11.2	9.1
Stroke	7.3	2.3	2.8	15.4	9.1
Carpal tunnel	6.0	6.2	5.6	6.4	9.1
Incontinence	5.1	1.6	4.7	7.4	18.2
Broken hip	2.0	0.8	1.9	2.7	9.1
Osteoporosis	1.6	1.6	0.9	2.7	0.0

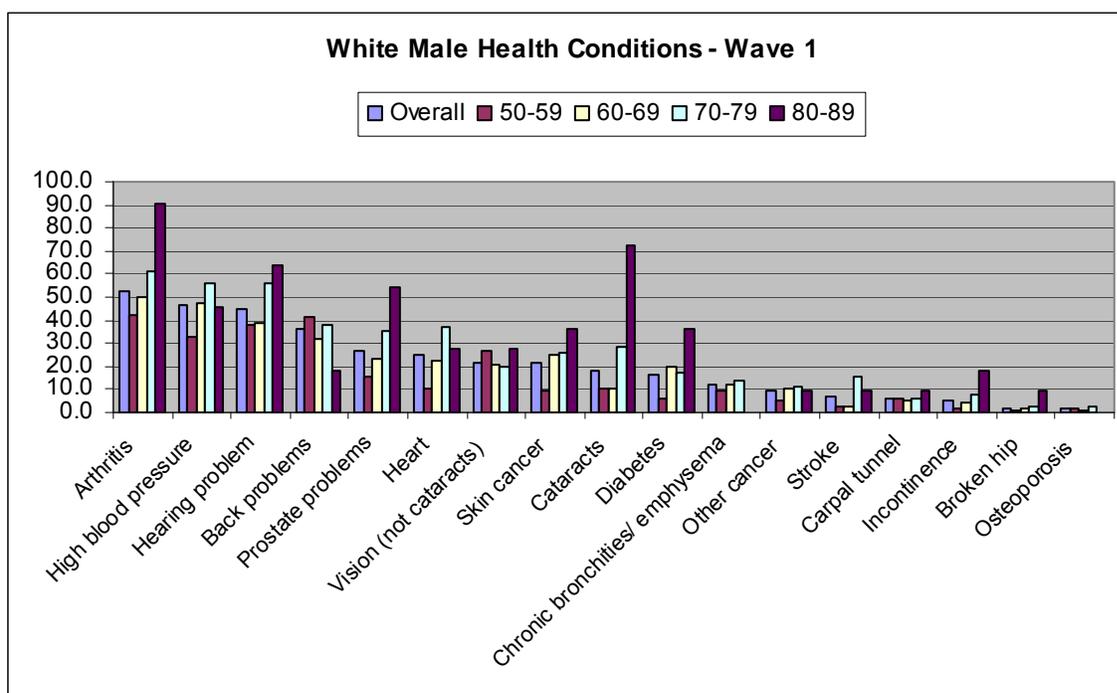


Figure 21. White male health conditions – Wave 1

Table 19. Black male health conditions expressed as percentages – Wave 1

<b>Black Male Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	55.7	44.6	63.2	58.3	58.3
Arthritis	47.9	39.3	50.9	58.3	58.3
Back problems	29.9	32.1	31.6	22.2	33.3
Vision (not cataracts)	24.6	28.6	28.1	13.9	33.3
Diabetes	22.8	10.7	26.3	33.3	25.0
Prostate problems	18.0	17.9	8.8	27.8	41.7
Heart	15.0	14.3	8.8	25.0	25.0
Hearing problem	14.4	7.1	10.5	27.8	33.3
Cataracts	10.8	3.6	12.3	11.1	41.7
Incontinence	8.4	7.1	8.8	8.3	16.7
Stroke	6.6	3.6	5.3	13.9	8.3
Other cancer	6.0	3.6	5.3	8.3	16.7
Chronic bronchitis/ emphysema	4.8	3.6	5.3	5.6	8.3
Osteoporosis	1.8	1.8	3.5	0.0	0.0
Carpal tunnel	1.8	1.8	1.8	2.8	0.0
Broken hip	1.2	0.0	0.0	2.8	8.3
Skin cancer	0.6	0.0	0.0	2.8	0.0

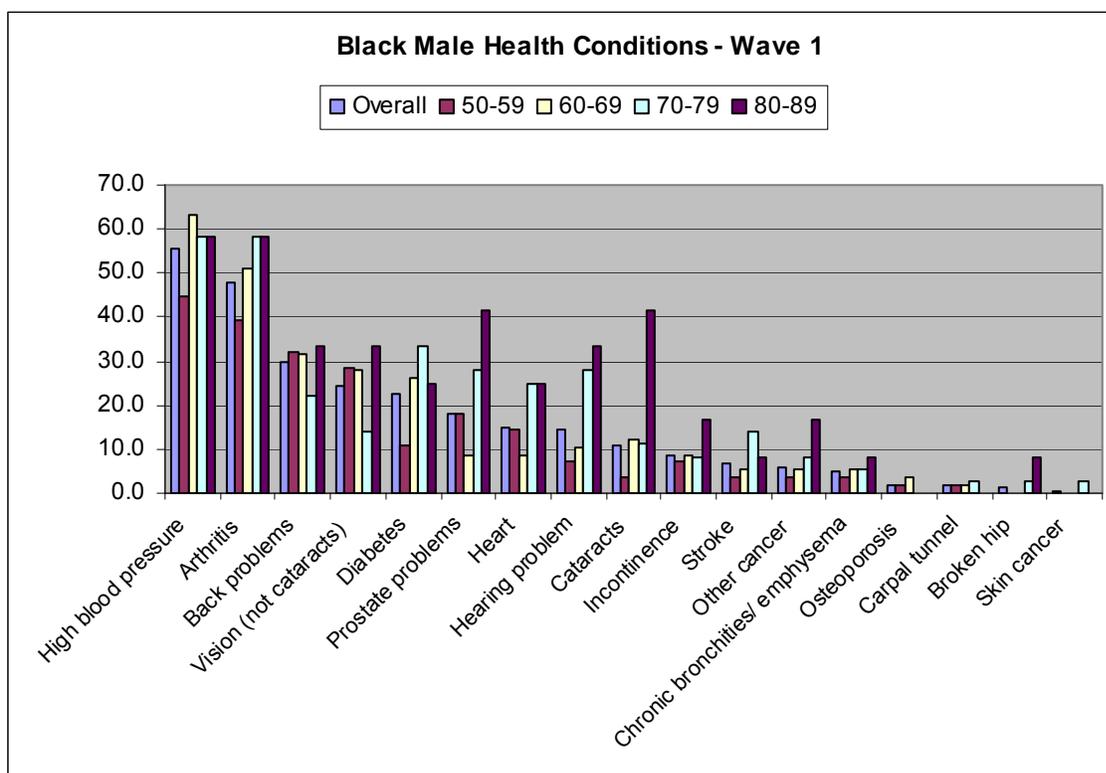


Figure 22. Black male health conditions – Wave 1

## Wave 3 Health Condition Results

Table 20. Health conditions overall and by age groups expressed as percentages – wave 3

Health Conditions Wave 3	Overall	50-59	60-69	70-79	80-89
Arthritis	54.8	46.1	56.7	59.5	60.9
High blood pressure	54.6	51.1	55.3	58.3	65.2
Back problems	33.8	35.5	31.1	36.0	34.8
Hearing problem	28.0	19.1	25.8	41.3	43.5
Vision (not cataracts)	25.3	26.6	25.4	23.1	21.7
Cataracts	24.4	8.2	24.2	42.1	56.5
Heart	19.8	11.0	17.7	32.8	30.4
Diabetes	15.7	10.6	16.7	19.8	17.4
Skin cancer	13.7	7.4	14.8	20.6	8.7
Prostate problems	10.6	7.4	7.9	19.4	13.0
Chronic bronchitis/emphysema	9.7	6.7	11.0	10.1	4.3
Osteoporosis	9.5	6.7	8.9	13.4	17.4
Carpal tunnel	9.0	11.7	8.9	6.9	4.3
Other cancer	8.9	3.9	9.8	12.6	8.7
Incontinence	6.0	4.6	5.0	9.7	4.3
Stroke	5.9	1.4	5.0	11.7	13.0
Broken hip	2.4	2.5	1.4	2.8	17.4

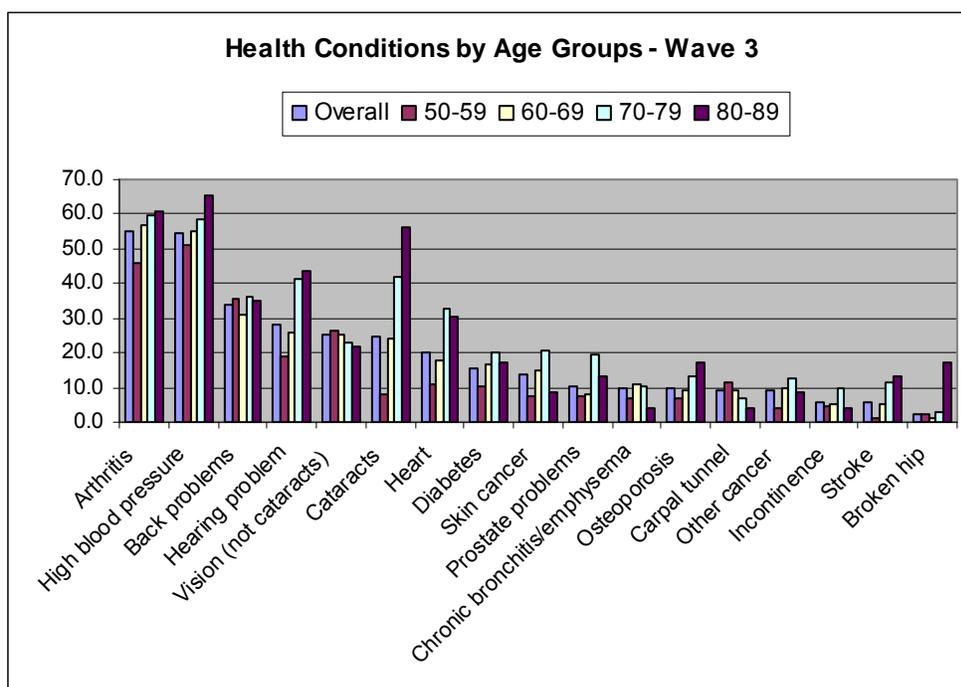


Figure 23. Health conditions by age groups – Wave 3

Table 21. Health conditions by sample cohorts expressed as percentages – wave 3

<b>Health Conditions Wave 3</b>	<b>White Female</b>	<b>Black Female</b>	<b>White Male</b>	<b>Black Male</b>
Arthritis	60.8	52.1	49.6	52.3
High blood pressure	55.1	71.2	47.5	63.3
Back problems	34.9	28.8	32.3	38.5
Vision (not cataracts)	29.4	23.3	20.2	29.4
Cataracts	26.4	30.1	23.3	18.3
Osteoporosis	18.5	12.3	1.8	1.8
Heart	16.2	17.8	25.6	13.8
Hearing problem	12.7	11.0	48.1	22.0
Carpal tunnel	12.7	6.8	6.5	4.6
Diabetes	11.0	27.4	16.3	22.0
Chronic bronchitis/emphysema	9.5	11.0	11.4	3.7
Skin cancer	8.5	0.0	25.6	0.9
Other cancer	7.5	6.8	11.4	8.3
Incontinence	5.7	8.2	5.2	7.3
Stroke	4.2	5.5	7.5	5.5
Broken hip	3.0	1.4	2.3	0.9
Prostate problems			20.7	21.1

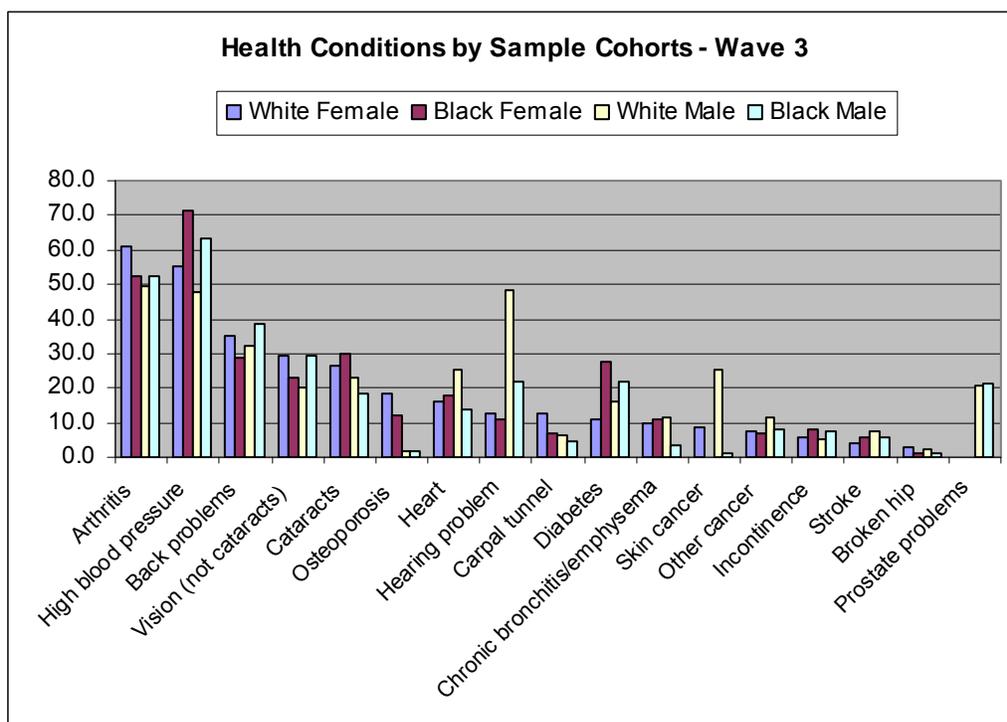


Figure 24. Health conditions by sample cohorts – Wave 3

Table 22. White female health conditions expressed as percentages – wave 3

White Female Health Conditions	Overall	50-59	60-69	70-79	80-89
Arthritis	60.8	51.2	62.4	67.9	50.0
High blood pressure	55.1	48.8	57.5	65.4	60.0
Back problems	34.9	35.5	32.0	38.5	30.0
Vision (not cataracts)	29.4	29.8	26.0	32.1	40.0
Cataracts	26.4	3.3	30.4	52.6	60.0
Osteoporosis	18.5	12.4	17.1	32.1	20.0
Heart	16.2	7.4	16.0	28.2	40.0
Hearing problem	12.7	7.4	12.7	17.9	30.0
Carpal tunnel	12.7	15.7	12.7	10.3	0.0
Diabetes	11.0	7.4	12.2	14.1	20.0
Chronic bronchitis/emphysema	9.5	8.3	9.9	7.7	10.0
Skin cancer	8.5	7.4	7.7	12.8	10.0
Other cancer	7.5	2.5	8.3	12.8	10.0
Incontinence	5.7	2.5	6.1	10.3	10.0
Stroke	4.2	0.0	6.1	5.1	20.0
Broken hip	3.0	4.1	1.1	2.6	30.0

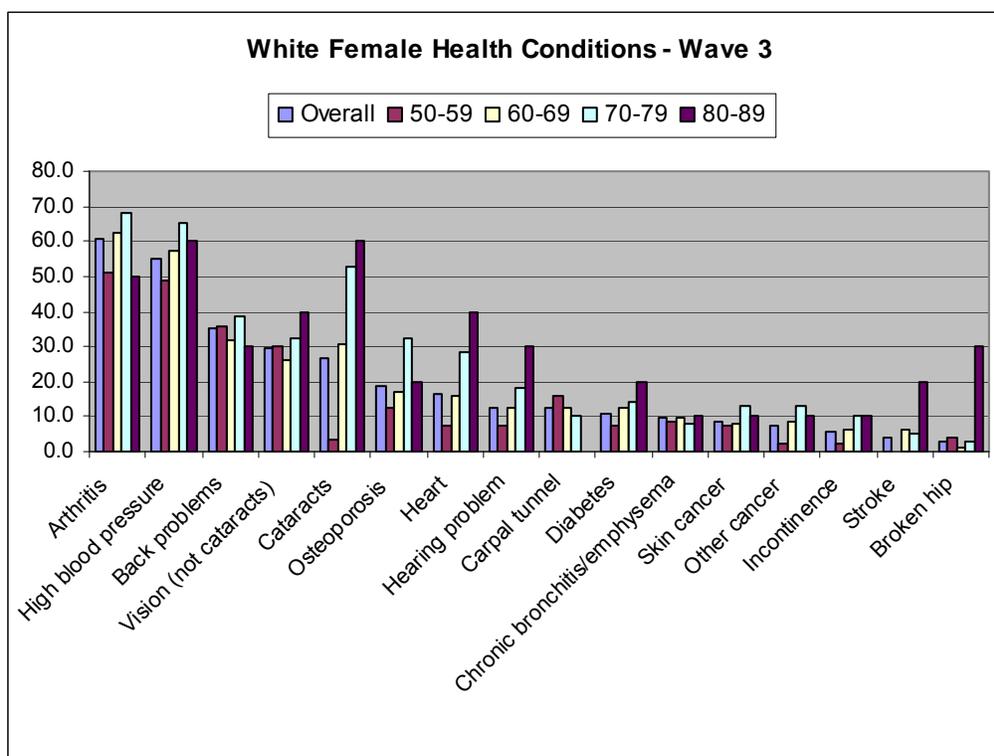


Figure 25. White female health conditions – Wave 3

Table 23. Black female health conditions expressed as percentages – wave 3

<b>Black Female Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	71.2	69.2	71.4	75.0	100.0
Arthritis	52.1	30.8	64.3	58.3	100.0
Cataracts	30.1	11.5	32.1	58.3	100.0
Back problems	28.8	34.6	32.1	25.0	0.0
Diabetes	27.4	19.2	32.1	41.7	0.0
Vision (not cataracts)	23.3	7.7	35.7	16.7	50.0
Heart	17.8	3.8	17.9	41.7	50.0
Osteoporosis	12.3	7.7	7.1	25.0	100.0
Hearing problem	11.0	7.7	10.7	16.7	50.0
Chronic bronchitis/emphysema	11.0	3.8	17.9	0.0	0.0
Incontinence	8.2	7.7	14.3	0.0	0.0
Carpal tunnel	6.8	7.7	7.1	8.3	0.0
Other cancer	6.8	3.8	7.1	0.0	0.0
Stroke	5.5	3.8	3.6	8.3	0.0
Broken hip	1.4	0.0	0.0	0.0	50.0
Skin cancer	0.0	0.0	0.0	0.0	0.0

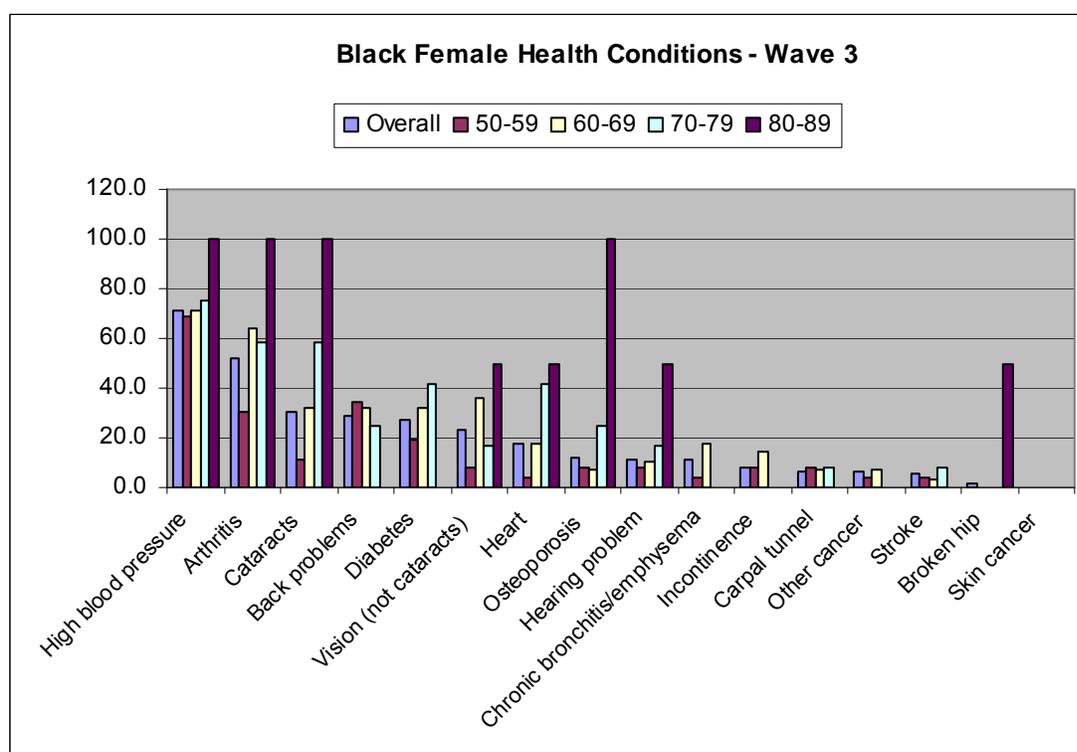


Figure 26. Black female health conditions – Wave 3

Table 24. White male health conditions expressed as percentages – wave 3

White Male Health Conditions	Overall	50-59	60-69	70-79	80-89
Arthritis	49.6	46.1	47.5	53.4	80.0
Hearing problem	48.1	37.1	45.1	58.8	60.0
High blood pressure	47.5	43.8	44.4	53.4	60.0
Back problems	32.3	33.7	30.9	32.8	40.0
Heart	25.6	14.6	21.0	38.2	40.0
Skin cancer	25.6	10.1	29.6	31.3	20.0
Cataracts	23.3	13.5	17.3	36.6	40.0
Prostate problems	20.7	11.2	17.3	31.3	20.0
Vision (not cataracts)	20.2	25.8	22.2	14.5	0.0
Diabetes	16.3	7.9	17.9	19.8	20.0
Other cancer	11.4	4.5	12.3	14.5	20.0
Chronic bronchitis/emphysema	11.4	5.6	13.6	13.0	0.0
Stroke	7.5	2.2	3.1	16.0	20.0
Carpal tunnel	6.5	7.9	7.4	3.8	20.0
Incontinence	5.2	4.5	3.1	8.4	0.0
Broken hip	2.3	1.1	2.5	3.1	0.0
Osteoporosis	1.8	1.1	1.2	3.1	0.0

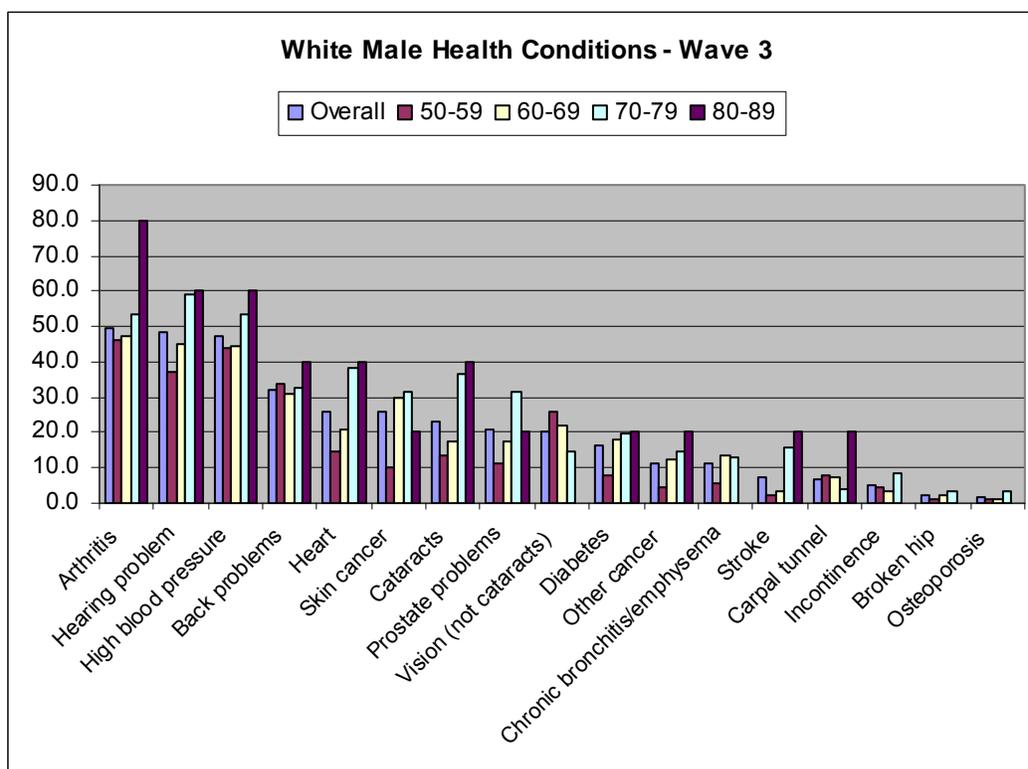


Figure 27. White male health conditions – Wave 3

Table 25. Black male health conditions expressed as percentages – wave 3

<b>Black Male Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	63.3	55.3	76.2	52.4	75.0
Arthritis	52.3	39.5	59.5	61.9	75.0
Back problems	38.5	42.1	23.8	52.4	75.0
Vision (not cataracts)	29.4	28.9	28.6	42.9	0.0
Diabetes	22.0	15.8	21.4	28.6	25.0
Hearing problem	22.0	21.1	16.7	33.3	50.0
Prostate problems	21.1	26.3	11.9	28.6	50.0
Cataracts	18.3	10.5	19.0	28.6	50.0
Heart	13.8	15.8	11.9	14.3	0.0
Other cancer	8.3	7.9	9.5	9.5	0.0
Incontinence	7.3	7.9	2.4	19.0	0.0
Stroke	5.5	2.6	7.1	9.5	0.0
Carpal tunnel	4.6	5.3	0.0	14.3	0.0
Chronic bronchitis/emphysema	3.7	5.3	0.0	9.5	0.0
Osteoporosis	1.8	2.6	0.0	4.8	0.0
Broken hip	0.9	0.0	0.0	4.8	0.0
Skin cancer	0.9	2.6	0.0	0.0	0.0

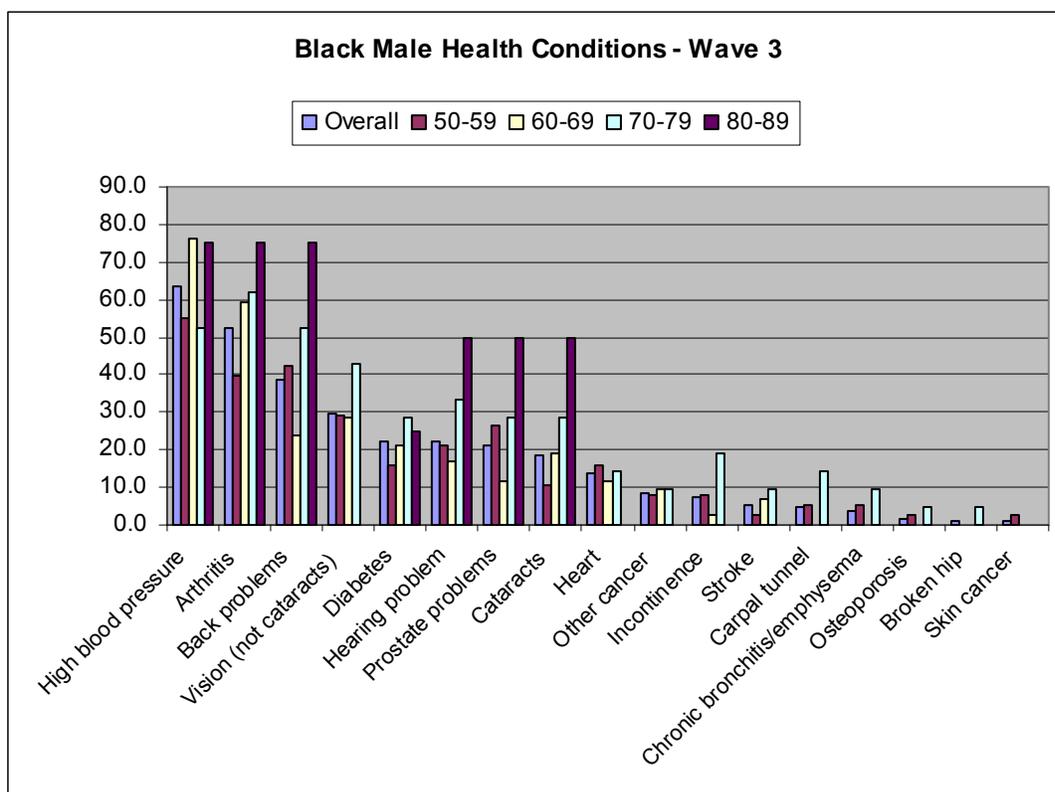


Figure 28. Black male health conditions

## Wave 4 Health Condition Results

Table 26. Health conditions overall and by age groups expressed as percentages – wave 4

<b>Health Conditions Wave 4</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	55.4	49.0	57.9	60.2	61.1
Arthritis	54.5	46.7	55.0	59.8	66.7
Back problems	32.3	34.5	29.6	32.8	38.9
Hearing problem	26.4	18.0	25.2	38.6	44.4
Cataracts	25.9	7.7	25.5	45.6	61.1
Heart	22.4	12.6	21.6	33.6	33.3
Vision (not cataracts)	21.1	21.5	21.4	20.7	22.2
Diabetes	17.0	12.3	18.8	18.7	22.2
Skin cancer	12.7	6.1	13.9	19.1	11.1
Dizziness or problems with balance	11.9	8.4	9.9	17.8	27.8
Osteoporosis	9.8	5.7	11.5	12.0	11.1
Other cancer	9.6	3.1	9.9	16.2	16.7
Carpal tunnel	9.4	13.4	7.5	7.9	16.7
Incontinence	8.6	5.4	8.7	11.6	11.1
Chronic bronchitis/emphysema	8.4	5.0	10.6	7.9	0.0
Stroke	4.7	1.5	4.3	9.5	0.0
Broken hip	2.1	1.9	1.2	3.3	11.1

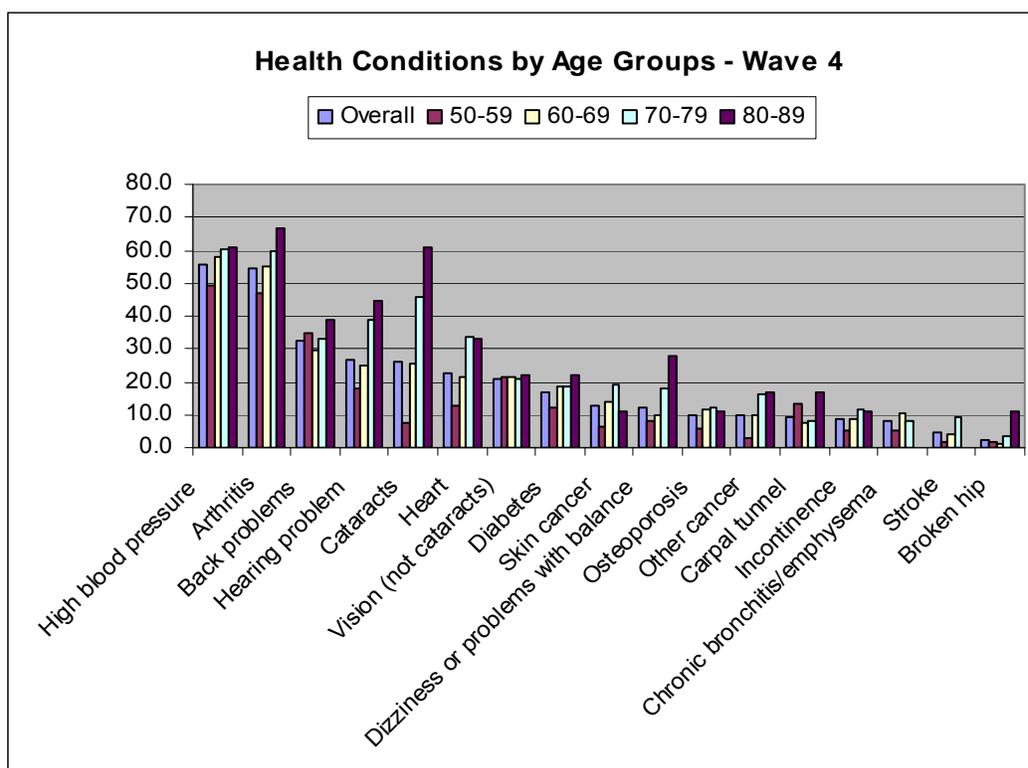


Figure 29. Health conditions by age groups – Wave 4

Table 27. Health conditions by sample cohorts expressed as percentages – wave 4

<b>Health Conditions Wave 4</b>	<b>White Female</b>	<b>Black Female</b>	<b>White Male</b>	<b>Black Male</b>
Arthritis	57.4	59.4	50.1	53.3
High blood pressure	55.9	75.0	50.9	55.1
Back problems	29.7	35.9	35.7	25.2
Cataracts	28.2	25.0	25.5	18.7
Vision (not cataracts)	19.5	21.9	21.3	24.3
Osteoporosis	18.5	9.4	2.9	2.8
Heart	18.2	15.6	30.7	12.1
Carpal tunnel	12.8	9.4	6.8	4.7
Hearing problem	12.3	12.5	44.9	19.6
Diabetes	11.8	31.3	18.1	22.4
Dizziness	11.5	12.5	12.9	7.5
Incontinence	10.5	4.7	6.0	11.2
Chronic bronchitis/emphysema	8.2	7.8	9.4	4.7
Skin cancer	7.9	0.0	23.4	0.0
Other cancer	6.9	4.7	13.4	10.3
Stroke	2.8	4.7	6.3	5.6
Broken hip	2.6	4.7	1.6	0.9

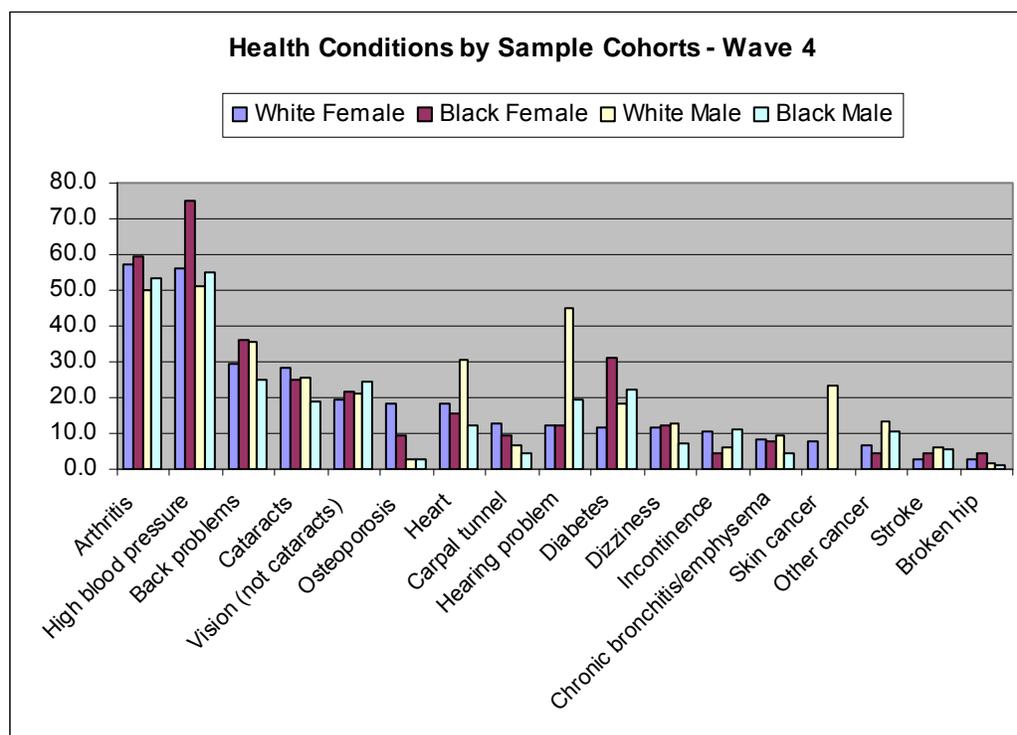


Figure 30. Health conditions by sample cohorts – Wave 4

Table 28. White female health conditions expressed as percentages – wave 4

White Female Health Conditions	Overall	50-59	60-69	70-79	80-89
Arthritis	57.4	47.7	59.1	63.2	71.4
High blood pressure	55.9	47.7	58.6	67.1	71.4
Back problems	29.7	27.9	29.3	28.9	28.6
Cataracts	28.2	4.5	30.9	57.9	71.4
Vision (not cataracts)	19.5	18.9	22.1	14.5	14.3
Osteoporosis	18.5	9.0	21.0	28.9	28.6
Heart	18.2	9.9	18.8	26.3	57.1
Carpal tunnel	12.8	16.2	11.6	11.8	0.0
Hearing problem	12.3	9.0	12.2	18.4	28.6
Diabetes	11.8	11.7	12.2	11.8	14.3
Dizziness	11.5	6.3	10.5	18.4	28.6
Incontinence	10.5	2.7	13.8	14.5	0.0
Chronic bronchitis/emphysema	8.2	5.4	9.4	6.6	0.0
Skin cancer	7.9	7.2	5.5	15.8	14.3
Other cancer	6.9	1.8	8.3	13.2	0.0
Stroke	2.8	0.0	5.0	2.6	0.0
Broken hip	2.6	2.7	1.1	5.3	14.3

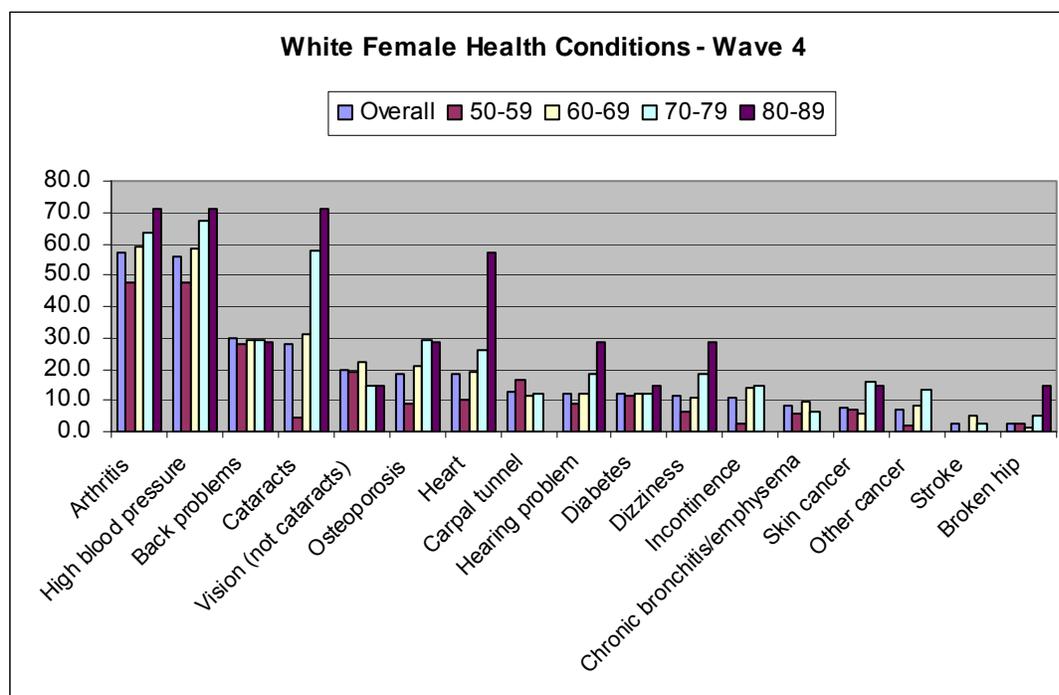


Figure 31. White female health conditions – Wave 4

Table 29. Black female health conditions – wave 4

<b>Black Female Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	75.0	65.0	79.3	81.8	100.0
Arthritis	59.4	45.0	55.2	81.8	100.0
Back problems	35.9	55.0	24.1	27.3	100.0
Diabetes	31.3	20.0	34.5	36.4	0.0
Cataracts	25.0	0.0	31.0	45.5	100.0
Vision (not cataracts)	21.9	30.0	20.7	18.2	0.0
Heart	15.6	10.0	10.3	27.3	100.0
Hearing problem	12.5	5.0	10.3	36.4	0.0
Dizziness	12.5	15.0	10.3	18.2	0.0
Osteoporosis	9.4	10.0	6.9	18.2	0.0
Carpal tunnel	9.4	15.0	3.4	18.2	0.0
Chronic bronchitis/emphysema	7.8	0.0	17.2	0.0	0.0
Stroke	4.7	5.0	3.4	9.1	0.0
Broken hip	4.7	0.0	3.4	9.1	100.0
Other cancer	4.7	0.0	6.9	0.0	0.0
Incontinence	4.7	10.0	3.4	0.0	0.0
Skin cancer	0.0	0.0	0.0	0.0	0.0

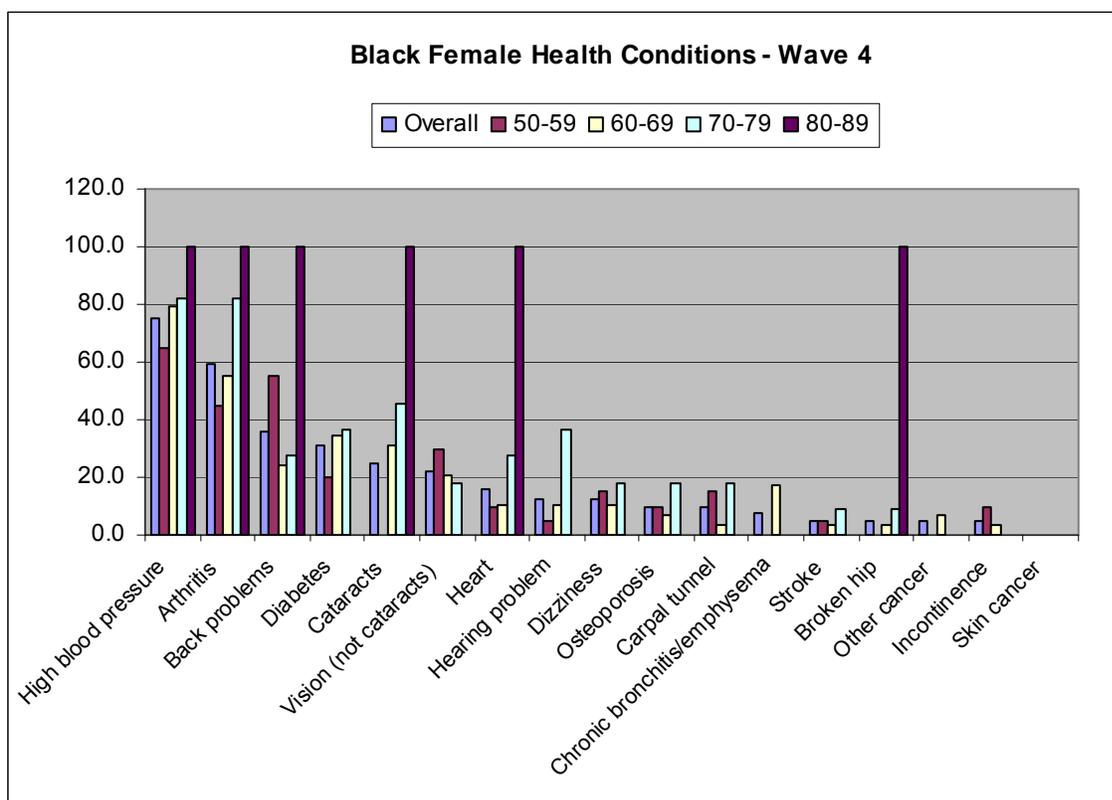


Figure 32. Black female health conditions – Wave 4

Table 30. White male health conditions expressed as percentages – wave 4

<b>White Male Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	50.9	45.5	49.7	56.5	33.3
Arthritis	50.1	45.5	49.7	54.2	33.3
Hearing problem	44.9	33.0	45.3	51.9	66.7
Back problems	35.7	40.9	33.3	35.9	0.0
Heart	30.7	17.0	29.6	41.2	33.3
Cataracts	25.5	11.4	19.5	41.2	66.7
Skin cancer	23.4	6.8	30.2	26.0	33.3
Vision (not cataracts)	21.3	20.5	18.9	23.7	66.7
Diabetes	18.1	8.0	21.4	19.8	66.7
Other cancer	13.4	2.3	12.6	21.4	33.3
Dizziness	12.9	9.1	9.4	19.1	33.3
Chronic bronchitis/emphysema	9.4	6.8	10.7	9.9	0.0
Carpal tunnel	6.8	11.4	5.0	5.3	33.3
Stroke	6.3	3.4	3.1	12.2	0.0
Incontinence	6.0	2.3	5.7	9.2	0.0
Osteoporosis	2.9	2.3	3.1	3.1	0.0
Broken hip	1.6	1.1	1.3	2.3	0.0

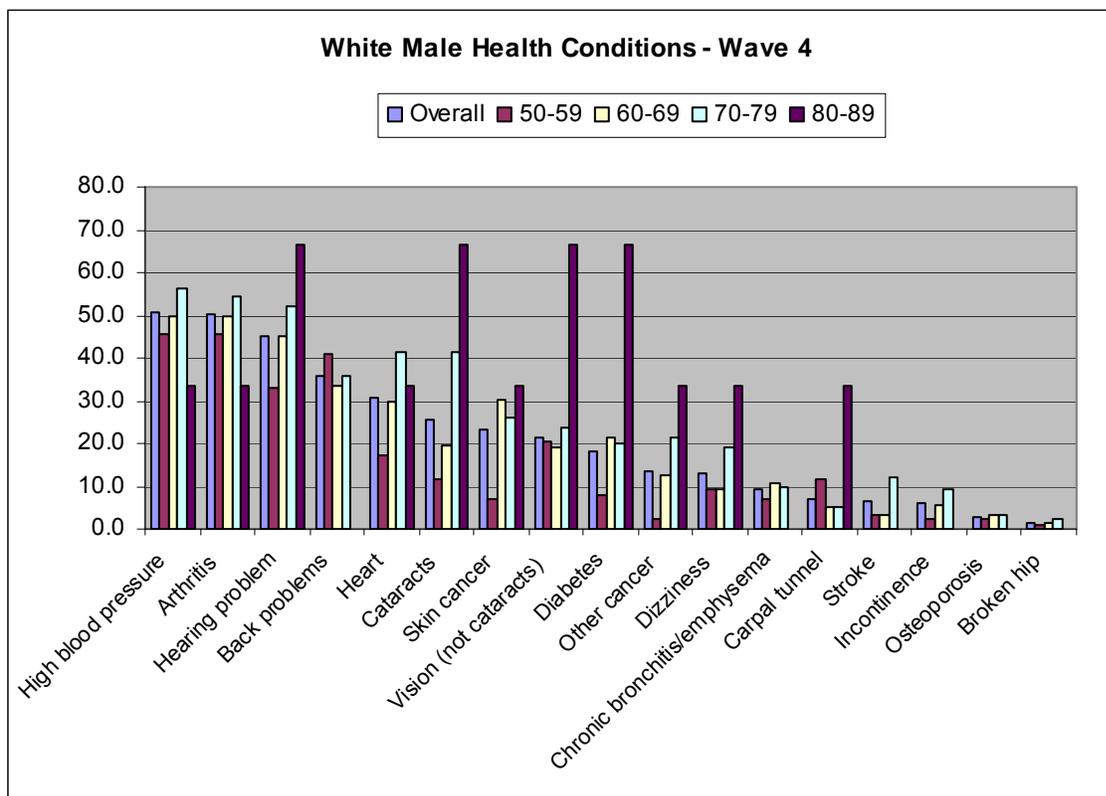


Figure 33. White male health conditions – Wave 4

Table 31. Black male health conditions expressed as percentages – wave 4

<b>Black Male Health Conditions</b>	<b>Overall</b>	<b>50-59</b>	<b>60-69</b>	<b>70-79</b>	<b>80-89</b>
High blood pressure	55.1	45.9	72.1	47.4	40.0
Arthritis	53.3	43.2	53.5	68.4	80.0
Back problems	25.2	29.7	18.6	26.3	40.0
Vision (not cataracts)	24.3	29.7	27.9	15.8	0.0
Diabetes	22.4	16.2	27.9	21.1	20.0
Hearing problem	19.6	16.2	16.3	26.3	60.0
Cataracts	18.7	13.5	20.9	21.1	40.0
Heart	12.1	13.5	11.6	10.5	0.0
Incontinence	11.2	16.2	2.3	21.1	20.0
Other cancer	10.3	10.8	9.3	5.3	40.0
Dizziness	7.5	8.1	7.0	5.3	20.0
Stroke	5.6	0.0	7.0	15.8	0.0
Carpal tunnel	4.7	5.4	2.3	5.3	20.0
Chronic bronchitis/emphysema	4.7	2.7	7.0	5.3	0.0
Osteoporosis	2.8	2.7	4.7	0.0	0.0
Broken hip	0.9	2.7	0.0	0.0	0.0
Skin cancer	0.0	0.0	0.0	0.0	0.0

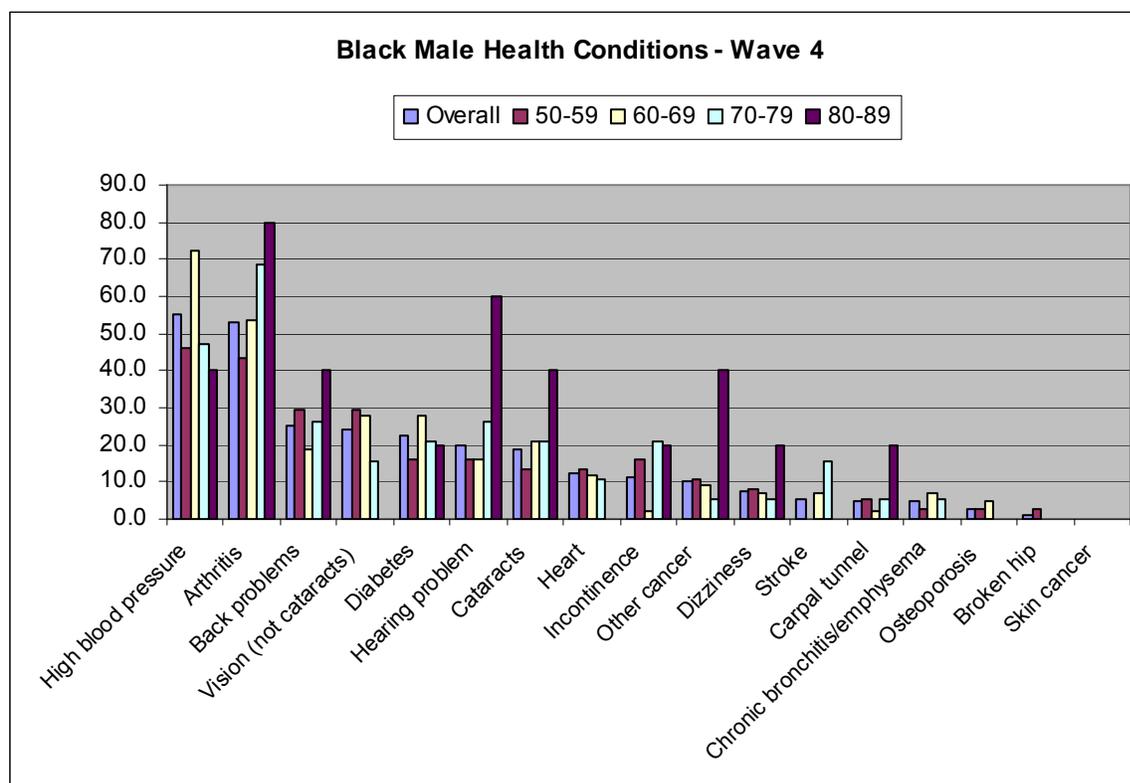


Figure 34. Black male health conditions – Wave 4

Health conditions were also grouped and analyzed by health classifications. Musculoskeletal and cardiovascular diseases (CVD) were the primary types of health conditions experienced by this group of older farmers. Vision and hearing were the next types of health conditions most commonly reported. The next series of tables and charts reflects the analysis of health conditions by health classifications.

Table 32. Health condition classifications across time expressed as percentages

Health Condition Classification	Wave 1	Wave 3	Wave 4
Musculoskeletal	64.3	66.5	66.6
CVD	58.1	64.4	64.3
Vision	36.9	42.8	39.8
Hearing	25.5	28.0	26.4
Cancer	18.5	20.4	20.4
Endocrine	15.9	16.6	18.3
Respiratory	9.9	9.7	8.4
Genito-urinary	7.1	6.0	8.6
Other	4.3	1.5	3.1
High cholesterol	0.8	2.6	2.4
Thyroid	0.5	1.1	1.5
Dizziness			11.9

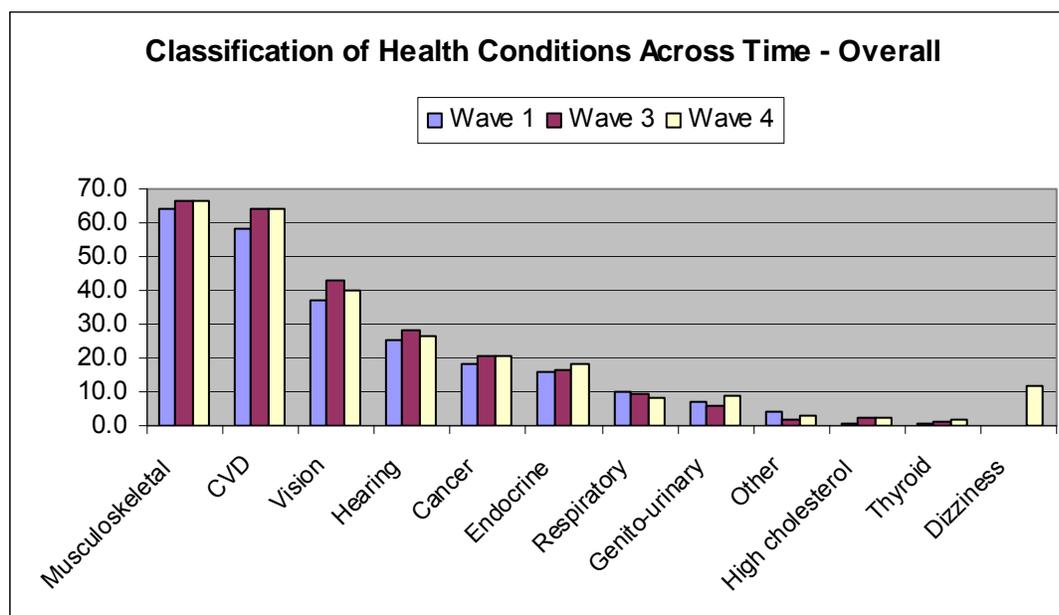


Figure 35. Classification of health conditions across time - overall

Table 33. Classification of health conditions by age groups expressed as percentages – wave 1

Classification	Overall	50-59	60-69	70-79	80-89
Muskuloskeletal	64.3	56.8	64.7	71.5	77.8
CVD	58.1	46.9	58.9	68.2	68.9
Vision	36.9	34.3	32.7	44.5	66.7
Hearing	25.5	19.5	21.4	38.1	46.7
Cancer	18.5	11.1	19.3	26.5	20.0
Endocrine	15.9	10.4	17.4	19.3	22.2
Respiratory	9.9	8.6	10.4	11.0	6.7
Genito-urinary	7.1	3.7	7.7	8.0	26.7
Other	4.3	4.9	4.4	4.1	2.2
High cholesterol	0.8	1.0	1.1	0.3	0.0
Thyroid	0.5	0.7	0.5	0.3	0.0

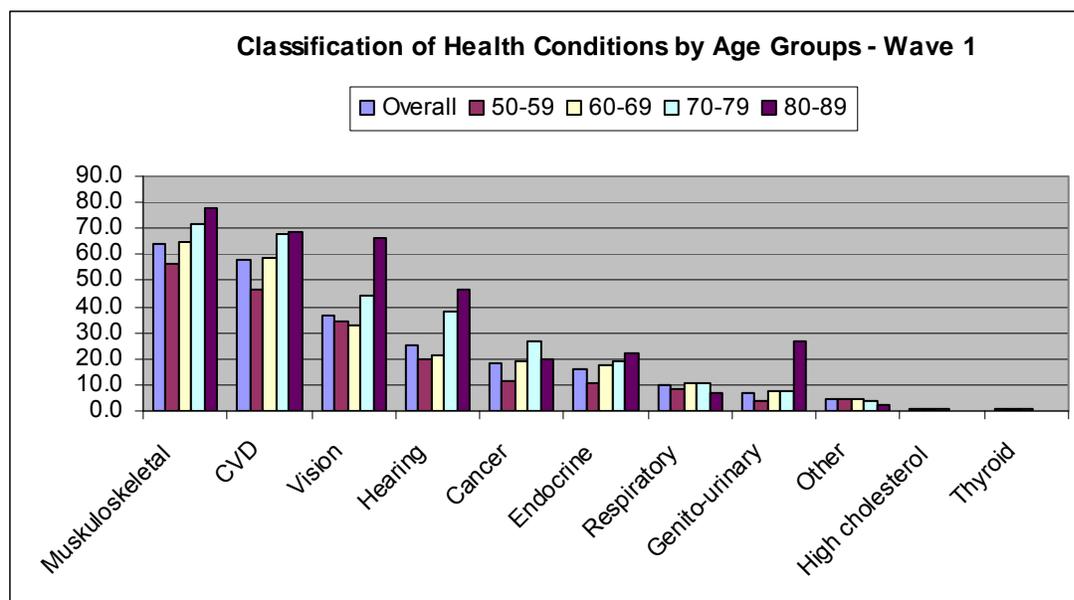


Figure 36. Classification of health conditions by age groups – Wave 1

Table 34. Classification of health conditions by sample cohorts expressed as percentages – wave 1

Classification	Overall	White Females	Black Females	White Males	Black Males
Musculoskeletal	64.3	67.9	58.0	63.7	56.3
CVD	58.1	55.7	71.4	56.8	59.9
Vision	36.9	39.0	37.8	35.3	32.9
Hearing	25.5	12.8	10.1	45.2	14.4
Cancer	18.5	15.8	5.9	28.0	6.6
Endocrine	15.9	11.9	22.7	16.1	22.8
Respiratory	9.9	8.7	5.9	13.2	4.8
Genito-urinary	7.1	9.4	3.4	5.1	8.4
Other	4.3	5.3	1.7	4.6	2.4
High cholesterol	0.8	1.1	1.7	0.5	0.0
Thyroid	0.5	1.1	0.8	0.0	0.0

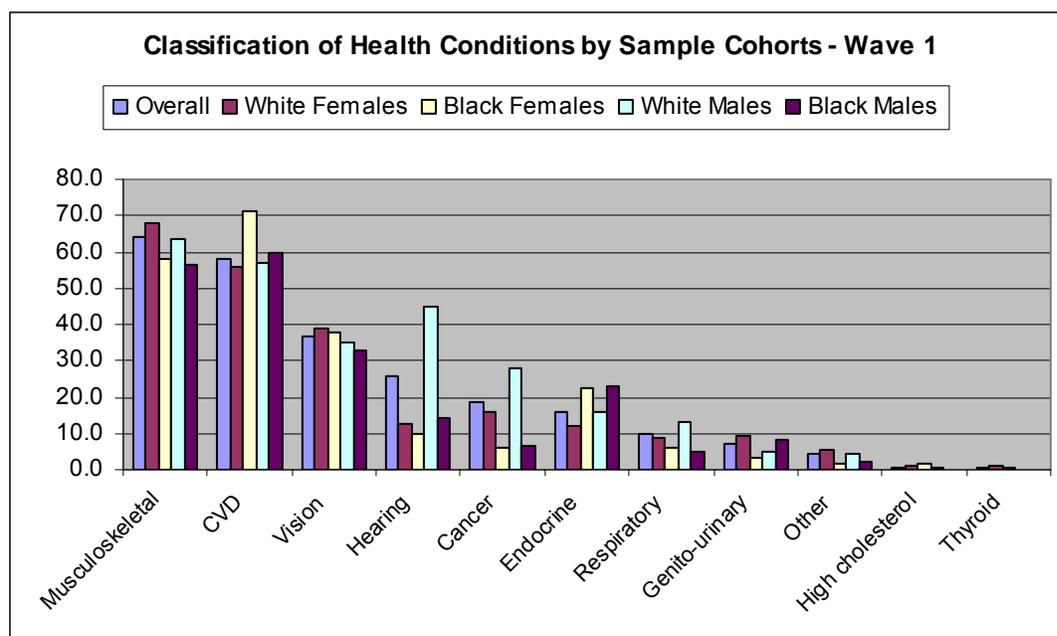


Figure 37. Classification of health conditions by sample cohorts – Wave 1

Table 35. Classification of health conditions by age groups expressed as percentages – wave 3

Classification	Overall	50-59	60-69	70-79	80-89
Musculoskeletal	66.5	62.1	66.5	69.6	78.3
CVD	64.4	58.2	64.6	71.7	82.6
Vision	42.8	33.3	42.8	51.8	60.9
Hearing	28.0	19.1	25.8	41.3	43.5
Cancer	20.4	10.3	22.2	29.6	17.4
Endocrine	16.6	12.1	17.9	19.8	17.4
Respiratory	9.7	6.7	11.0	10.1	4.3
Genito-urinary	6.0	4.6	5.0	9.7	4.3
High cholesterol	2.6	3.9	3.1	0.8	0.0
Other	1.5	2.1	1.7	0.4	0.0
Thyroid	1.1	1.8	1.4	0.0	0.0

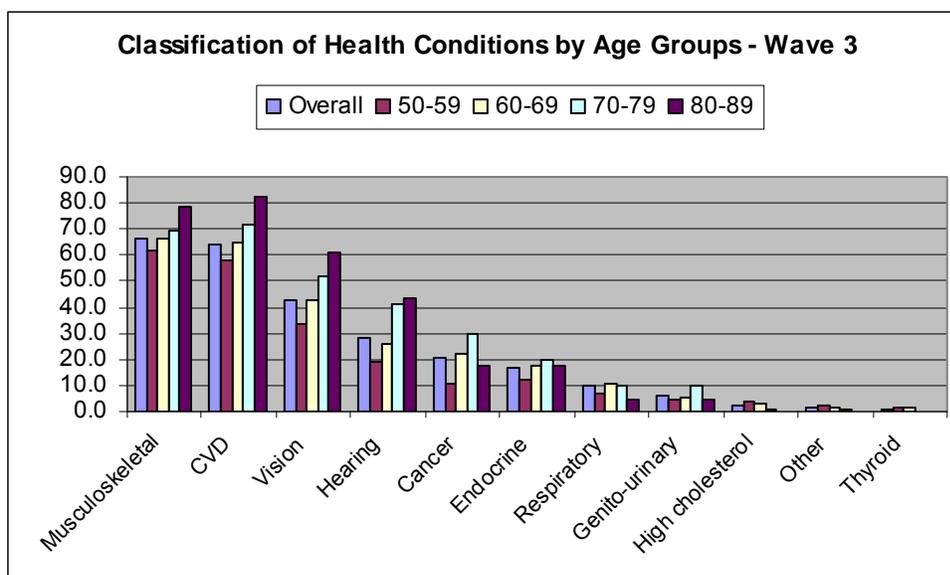


Figure 38. Classification of health conditions by age groups – Wave 3

Table 36. Classification of health conditions by sample cohorts expressed as percentages, wave 3

<b>Classification</b>	<b>Overall</b>	<b>White Females</b>	<b>Black Females</b>	<b>White Males</b>	<b>Black Males</b>
Musculoskeletal	66.5	72.8	57.5	62.3	63.3
CVD	64.4	63.6	74.0	61.8	68.8
Vision	42.8	48.1	45.2	38.2	37.6
Hearing	28.0	12.7	11.0	48.1	22.0
Cancer	20.4	15.0	6.8	32.3	9.2
Endocrine	16.6	12.7	27.4	16.8	22.0
Respiratory	9.7	9.5	11.0	11.4	3.7
Genito-urinary	6.0	5.7	8.2	5.2	7.3
High cholesterol	2.6	3.2	4.1	1.3	3.7
Other	1.5	2.5	0.0	0.8	0.9
Thyroid	1.1	2.2	0.0	0.5	0.0

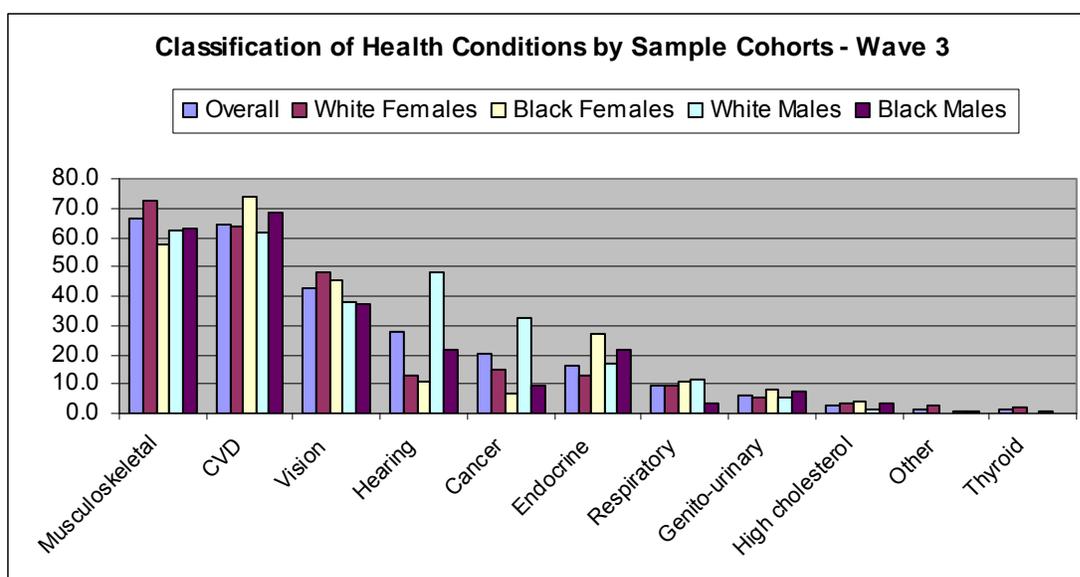


Figure 39. Classification of health conditions by sample cohorts – Wave 3

Table 37. Classification of health conditions by age groups expressed as percentages – wave 4

Classification	Overall	50-59	60-69	70-79	80-89
Musculoskeletal	66.6	61.3	66.3	71.0	77.8
CVD	64.3	54.8	66.6	72.2	72.2
Vision	39.8	26.1	39.7	54.8	66.7
Hearing	26.4	18.0	25.2	38.6	44.4
Cancer	20.4	9.2	22.1	30.3	27.8
Endocrine	18.3	12.6	20.4	19.9	22.2
Dizziness or balance problems	11.9	8.4	9.9	17.8	27.8
Genito-urinary	8.6	5.4	8.7	11.6	11.1
Respiratory	8.4	5.0	10.6	7.9	0.0
Other	3.1	3.4	3.4	2.1	0.0
High cholesterol	2.4	3.1	3.1	0.4	0.0
Thyroid	1.5	0.8	1.7	1.7	0.0

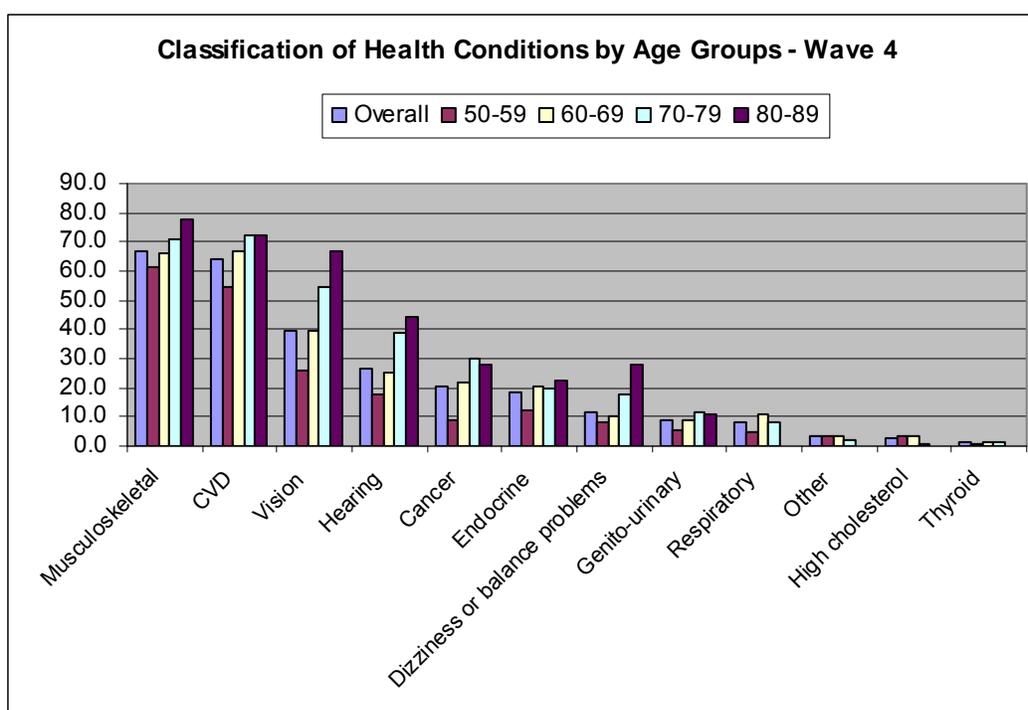


Figure 40. Classification of health conditions by age groups – Wave 4

Table 38. Classification of health conditions by sample cohorts expressed as percentages, wave 4

Classification	Overall	White Females	Black Females	White Males	Black Males
Musculoskeletal	66.6	69.0	67.2	65.1	59.8
CVD	64.3	61.8	82.8	64.0	59.8
Vision	39.8	41.5	42.2	38.6	34.6
hearing	26.4	12.3	12.5	44.9	19.6
Cancer	20.4	13.8	4.7	32.8	10.3
Endocrine	18.3	14.6	31.3	18.4	22.4
Dizziness or balance problems	11.9	11.5	12.5	12.9	7.5
Genito-urinary	8.6	10.5	4.7	6.0	11.2
Respiratory	8.4	8.2	7.8	9.4	4.7
Other	3.1	5.6	1.6	1.3	1.9
High cholesterol	2.4	2.8	10.9	0.8	1.9
Thyroid	1.5	3.1	0.0	0.5	0.0

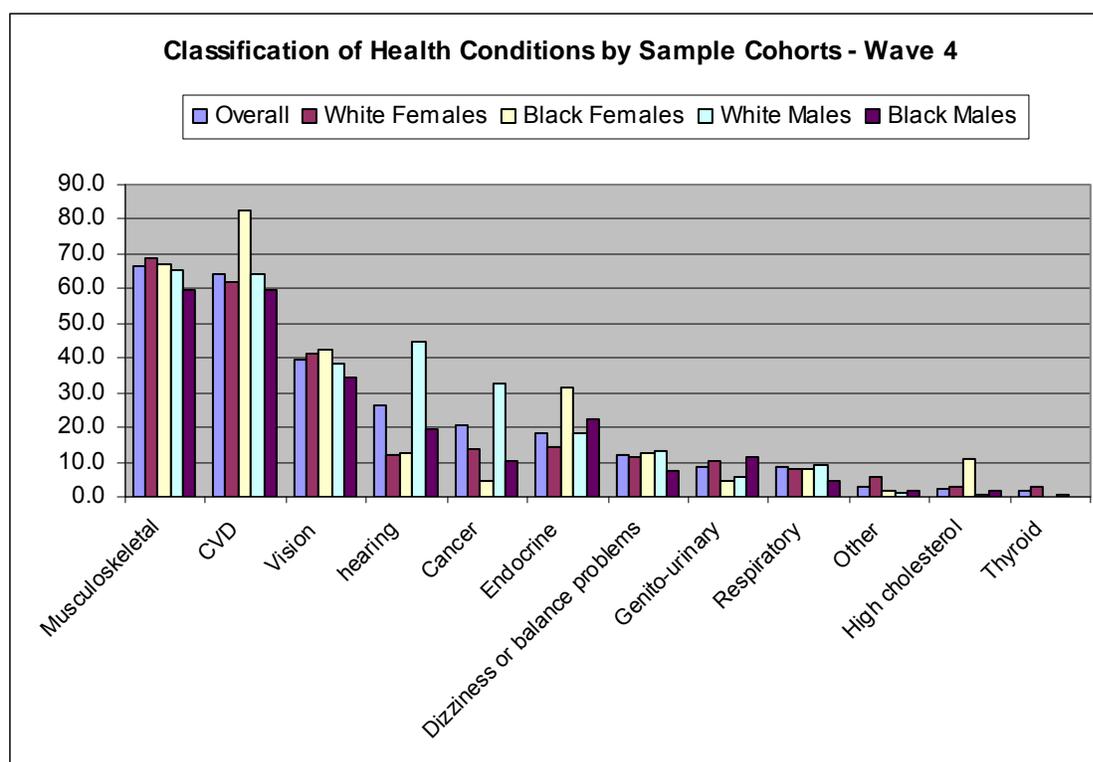


Figure 41. Classification of health conditions by sample cohorts – Wave 4

## Physical Motor Abilities

In wave two (N=1,119) we asked a list of nine physical motor abilities taken from the NHIS Supplement on Aging. The primary challenge for the sample was stooping, crouching, or kneeling. Forty-one percent reported difficulty with this activity. Prevalence of other difficulties was as follows: standing or being on your feet for two hours (29%), walking for ¼ mile (18%), reaching up over your head (17%), sitting for two hours (15%). Ten percent of the respondents reported difficulty doing each of these activities: walking up 10 steps without resting, lifting or carrying something as heavy as 10 pounds, and using your fingers to pick up a penny off a table. Only two percent reported difficulty reaching out as if to shake a hand. Three fourths of the sample took prescription medication on a daily basis, with the most common medication being for hypertension. However, nearly three fourths (71%) reported having a complete physical examination within the past 12 months. Sixty-nine percent of the males and 71% of the females were current on prostate and mammogram screenings, respectively.

## Indicators of Health Care

Wave four data included indicators of health care. Nearly all the sample (92%) had some form of health insurance: many reported multiple sources of health insurance (Table 39). The primary types of insurance were Medicare (61%) and private insurance (42%). Despite the permeation of health insurance, 7% of the sample reported they delayed medical care in the past 12 months due to cost. A slightly higher percentage (8.5%) delayed dental care due to cost in the same time period. The presence of an off-farm job increased the likelihood of delay of dental care but not of medical care.

Table 39. Frequency distributions for farm type, work status, health status indicators and health and dental care delay outcomes (N = 957)

Variable	<i>n</i>	%
Type of farm		
Livestock and crops	658	69.8
Crops only	255	27.0
Livestock only	30	3.2
Work on farm		
Yes	781	81.7
No	175	18.3
Have an off-farm job		
Yes	315	33.0
No	640	67.0
Take prescription medication daily		
Yes	750	78.5
No	206	21.6
Insurance		
Have Medicare	588	61.4
Have Medicaid	114	11.9
Have Veteran's insurance	76	7.9
Have private insurance (primary)	405	42.3
Have private insurance (supplemental)	429	44.8
Without any health insurance	32	3.3
Did not seek/delayed seeking medical care		
Yes	66	6.9
No	888	93.1
Did not seek/delayed seeking dental care		
Yes	81	8.5
No	874	91.5

*Predictors of delay in seeking health care.* With demographic, farm, work, health, and insurance variables included in the GEE model, significant predictors of delay in health care included age, income, self-rated health, number of health conditions, and having private insurance as the primary policy (see Table 40). The magnitude of the odds ratios indicated that those who were younger, with lower annual income, poorer self-rated health, more current medical conditions, and without private medical insurance as their primary health policy, were more likely to delay. The variance inflation factors for this model, both for the full sample and the five subsamples chosen, were all less than 4, indicating that multicollinearity is likely not distorting regression estimates.

*Predictors of delay in seeking dental care.* With demographic, farm, work, health, and insurance variables included in the GEE model, significant predictors of delay in health care were income, having an off-farm job, taking prescription medication daily, and having Medicaid as at least one source of health coverage. The direction of the odds ratios indicated that those who had a lower income were more likely to delay dental care, compared to more affluent participants. Those who had an off-farm job were more likely to delay than those without, and those who took prescription drugs daily were more likely to delay seeking dental care, compared to those who used prescription medication less often. On the other hand, those who had Medicaid were less likely than subjects without this type of insurance to delay seeking dental care. The variance inflation factors for this model, considering the full sample and five subsamples as described above, were all less than 4; this indicates that multicollinearity is not causing distortion in the regression estimates.

Table 40. Logistic regression models for delay in seeking medical and dental care, with odds ratios, confidence intervals and significance tests

Predictor	Delay in seeking medical care			Delay in seeking dental care		
	Odds Ratio (OR)	95% Confidence Interval for OR	$\chi^2$ (p-value)	Odds Ratio (OR)	95% Confidence Interval for OR	$\chi^2$ (p-value)
Male	0.9	0.5 - 1.8	< 0.1 (.9)	0.8	0.5 - 1.5	0.5 (.5)
White	1.7	0.7 - 4.2	1.3 (.3)	0.6	0.3 - 1.1	2.6 (.1)
Age	0.9	0.8 - 0.9	13.5 (.0002)	1.0	0.9 - 1.0	1.4 (.2)
Married	1.3	0.5 - 3.8	0.3 (.6)	0.7	0.3 - 1.6	0.6 (.5)
Income	0.5	0.3 - 0.6	20.8 (<.0001)	0.6	0.4 - 0.7	13.7 (.0002)
Type of farm			2.6 (.3)			0.3 (.9)
Livestock & crops	0.8	0.1 - 4.4		0.9	0.2 - 3.4	
Crops only	1.5	0.3 - 8.5		1.1	0.3 - 4.3	
Work on farm	2.0	0.7 - 5.1	2.2 (.1)	1.2	0.6 - 2.4	0.2 (.7)
Off-farm job	1.4	0.7 - 2.8	0.7 (.4)	1.9	1.1 - 3.6	4.2 (.04)
% of income from farming	1.0	1.0 - 1.0	1.6 (.2)	1.0	1.0 - 1.0	< 0.1 (.8)
Self-rated health	0.7	0.5 - 1.0	4.3 (.04)	0.7	0.5 - 1.0	3.4 (.07)
Number of health conditions	1.3	1.1 - 1.5	6.4 (.01)	1.1	0.9 - 1.3	1.2 (.3)
Take prescriptions daily	1.5	0.6 - 3.8	0.7 (.4)	2.9	1.1 - 7.6	6.5 (.01)
Medicare	0.8	0.3 - 2.1	0.2 (.7)	1.0	0.4 - 2.4	< 0.1 (>.9)
Medicaid	1.2	0.4 - 3.7	< 0.1 (.8)	0.2	0.0 - 0.8	10.4 (.001)
Veteran's insurance	0.4	0.0 - 2.9	1.8 (.2)	0.7	0.2 - 2.4	0.3 (.6)
Private (primary)	0.4	0.2 - 0.8	5.9 (.02)	1.0	0.5 - 1.9	< 0.1 (.9)
Private (supplement)	0.5	0.2 - 1.1	2.7 (.1)	0.7	0.4 - 1.4	0.9 (.4)

## Mental Health Indicators

### Depressive Symptoms (CES-D Scores)

The CES-D Scale is a self-report measure developed to screen for depressive symptoms in the general population (Radloff, 1977). It was designed to measure current levels of depressive symptoms and was not intended as a clinical diagnostic tool or as an evaluative tool for measuring the severity of depression over the course of treatment. This instrument is scored by summing the 16 items that indicate a high level of depressive symptoms and then reverse coding the 'positive' items and adding them to the other 16 variables to obtain a total score. Total scores (ranging from 0 to 60) are recommended as an estimate of the degree of depressive symptomatology, with higher scores indicating more depressive symptoms. A cutoff score of 16 represents clinically significant depressive symptoms (Radloff, 1977; Blazer & Williams, 1980). Husiani and colleagues (1980) further delineated depressive symptoms into three groups: 0-16, not depressed; 17-23, at risk for depression; and 24+, probable depression. Respondents were asked to complete the 20-item CES-D scale to estimate the level of depressive symptoms at each of baseline, Wave 3 and Wave 4.

Three major sets of analyses were used to examine primary research questions for this study. First, percentages, means, and standard deviations were used to describe the sample and primary variables. Longitudinal analyses as described earlier in the report were also conducted for the overall sample and by race, gender and age. A second set of procedures was used to examine the reliability and factor structure of the CES-D among older farmers. These included Cronbach's alpha as well as exploratory and confirmatory factor analyses. Finally, the data were analyzed to examine the influence of the couples on each other. This last analysis is especially enlightening for the development of counseling aging farm couples and has not been previously reported in the literature.

#### *Depressive Symptoms at Baseline*

The average CES-D score was 7.0 (SD = 8.2), with a range of 0-52 out of a possible maximum score of 60. Approximately, 12% of older farmers were identified as depressed using cut-offs established for the original CES-D ( $\geq 16$ ). Of this 12%, half were classified as at-risk for depression (scores between 17 and 22) while the other half were identified as probable cases (scores  $\leq 23$ ).

There were baseline differences in CES-D score, both among race/gender groups and also among age cohorts. In particular, the main effect of race/gender class was significant ( $F = 3.1, p = .03$ ), and this was also true for the one-way model that contained the main effect of age cohort ( $F = 3.1, p = .03$ ). The post hoc analysis indicated that for the race/gender model, White men had significantly lower CES-D scores compared with White women, while all other pairwise comparisons were not significant (see Figure 42).

The post hoc analysis for the significant one-way model with age cohort as the class variable demonstrated that compared with other cohorts, those in the 80-89 age category at baseline had significantly greater depressive symptoms scores compared with the remaining three age cohorts; all other pairwise comparisons among the age categories on baseline CES-D were not significant (see Figure 43).

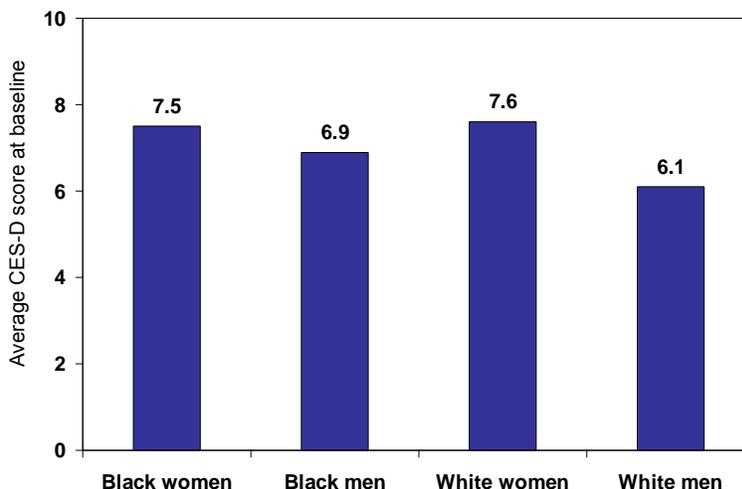


Figure 42. Average Depressive Symptoms Score (CES-D) score by race/gender

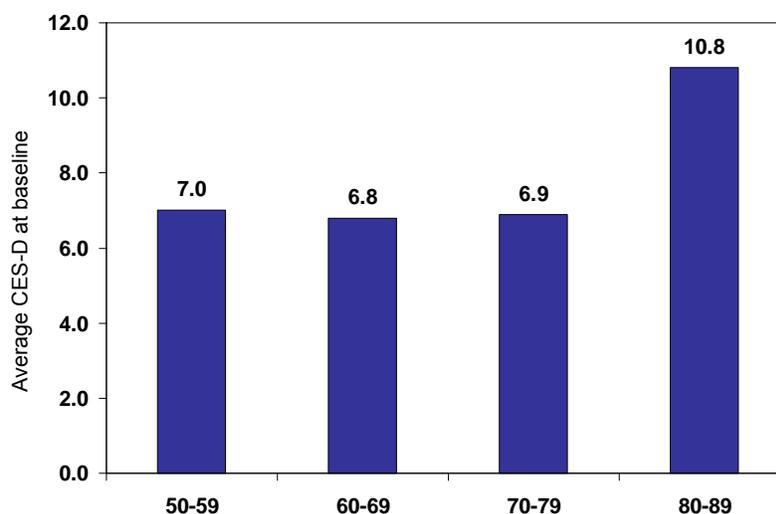


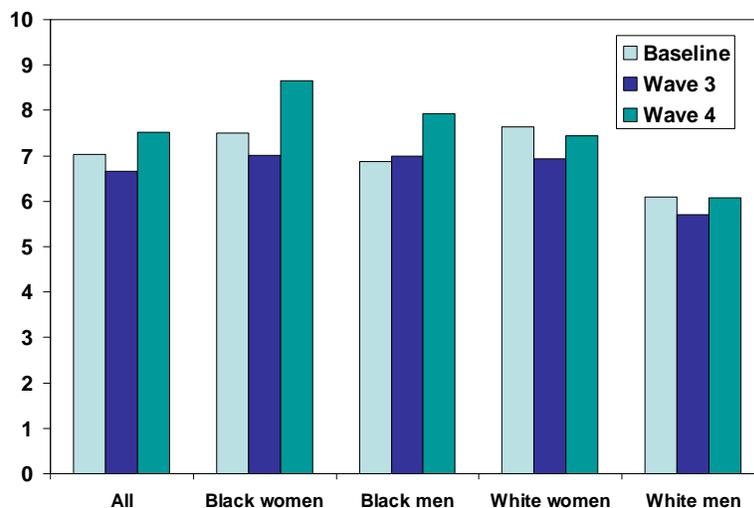
Figure 43. Average Depressive Symptoms Score (CES-D) by age cohort

### *Changes in CES-D Score over Time*

The average CES-D scores did not change significantly over time (i.e., the Time main effect in the one-way model was not significant:  $F = 2.4, p = .09$ ).

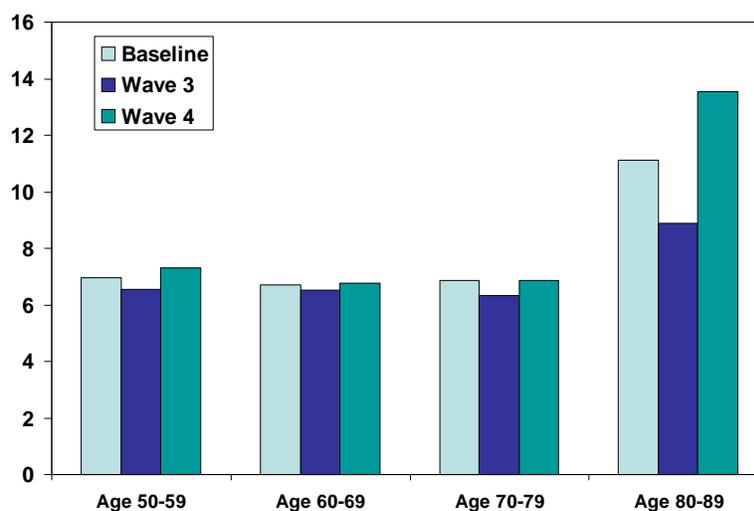
For the comparison of changes over time among the race/gender groups, the main effect of Gender/race was significant ( $F = 4.8, p = .003$ ; see Figure 44). The main effect of Time and the interaction between Gender/race and Time were not significant. The means at each timepoint for each race/gender category are shown below, but the post hoc comparisons were not made at this level because the interaction was not significant. The post hoc analysis revealed that the significant race/gender factor was due to the phenomenon that White men had significantly lower CES-D scores compared with the other three groups, and that the other groups did not differ significantly from each other (see Figure 45).

For the comparison of changes over time among the age cohorts, the repeated measures model indicated that the main effect of Time was significant ( $F = 4.6, p = .01$ ) as was the main effect of age cohort ( $F = 5.0, p = .002$ ). The interaction between Time and Age was not significant. The post hoc analysis of the main effect of time revealed a significant increase from Wave 3 to Wave 4 for the entire group of subjects, while the main effect of age cohort was due to increased CES-D scores in the 80-89 group relative to the remaining cohorts. Figure 24 shows the mean scores for each combination of Time and Age, but the post hoc analysis of the time by age interaction is not warranted since the interaction effect was not significant.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 44. Average CESD score over time, for the entire sample and by race/gender category.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 45. Average CESD score over time, by age cohort at Baseline

## Examination of the CES-D Factor Structure

Using one half of the sample that completed all items of the CES-D (n=654) and principal component analysis, an exploratory factor analysis was used to provide an initial CES-D factor structure to later be confirmed with confirmatory factor analysis procedures. Prior to this analysis, .5 was set as the factor score value for item inclusion. The subsequent exploratory procedure yielded a four-factor, 17-item scale. Results showed that three items did not have factor scores  $\geq .5$ : *I did not feel like eating – my appetite was poor*; *I talked less than usual*; and *I felt lonely*. The seventeen items loading on four factors for this exploratory procedure accounted for approximately 52% of the variance with the first two factors accounting for 29% of the variance (depressed affect items, 15% and somatic items, 14%). The third (identified here as apprehension) and fourth factors (positive well-being) both accounted for about 11% of the variance. The third factor, apprehension, combined two items previously identified as interpersonal (*People were unfriendly* and *I felt that people disliked me*) and two items previously identified as related to the depressed affect factor (*I felt fearful* and *I thought my life had been a failure*). The scale had a reliability of .83.

The second half of the sample (n=654) was used to validate the four-factor, 17-item factor structure developed using exploratory techniques. Several measures of model fit were used to assess the model generated by exploratory analysis (Table 41). Although the model  $\chi^2$  was significant (443.98,  $df = 115$ ,  $p \leq .00$ ), other goodness of fit statistics indicated that the model was acceptable and, thus, verified the four-factor, 17-item CES-D factor structure generated in exploratory procedures for older farmers. These included a GFI of .93, and Adjusted GFI of .90, a normed fit index of .94, Critical N of 223, and a root mean square residual of .03.

Table 41. CES-D factor structure

CES-D Item	Exploratory Loadings	Confirmatory FA n = 654	
		Std. Lambda-Y	Std. Gamma
<b>Depressed Affect</b>			.95
<i>I felt sad.</i>	.71	.48	
<i>I felt depressed.</i>	.67	.66	
<i>I felt that I could not shake off the blues even w/ help from my family or friends.</i>	.66	.52	
<i>I had crying spells.</i>	.66	.27	
<b>Somatic</b>			.91
<i>I could not “get going”.</i>	.69	.56	
<i>I felt that everything I did was an effort.</i>	.65	.64	
<i>My sleep was restless.</i>	.62	.41	
<i>I had trouble keeping my mind on what I was doing.</i>	.60	.46	
<i>I was bothered by things that usually don’t bother me.</i>	.52	.57	
<b>Interpersonal</b>			.69
<i>People were unfriendly.</i>	.73	.16	
<i>I felt that people disliked me.</i>	.72	.23	
<i>I felt fearful.</i>	.58	.27	
<i>I thought my life had been a failure.</i>	.52	.31	
<b>Positive Affect</b>			.49
<i>I enjoyed life.</i>	.73	.62	
<i>I was happy.</i>	.73	.68	
<i>I felt hopeful about the future.</i>	.71	.58	
<i>I felt that I was just as good as other people.</i>	.65	.38	

## Predictors of Depressive Symptoms in Older Farm Couples

Since many of the participants included in this study also had a spouse participating, we investigated a method used for regression when the data are paired. This method, the Actor-Partner Interdependence Model (APIM), takes into account the dependence among observations from the same household and allows the determination of predictors of the outcome variable in this context.

It was hypothesized that among older farmers, depressive symptoms may be influenced by work patterns, satisfaction with work, stress, and health status. In this analysis, it is not just the person's own work, stress, and health status that may influence his or her depressive symptoms score, but the model estimates the impact of the partner's work, stress, and health status on the depressive symptoms of each individual. This type of analysis is important for a study which included so many couples, not only because it allows for inclusion of both spouses in the same analysis, but also because members of a couple may well influence each other's depressive symptoms, and this model is able to test that.

The purposes of this analysis were to: a) determine whether depressive symptoms score is predicted by hours worked on the farm, satisfaction with work, number of health conditions, perceived stress, and demographics; and b) assess the degree of influence the members of the couples have on each other.

As background for the development of the APIM methodology, the challenge is to incorporate the responses from couples (dyads) into a single analysis, given they are correlated. When the research focus is the couple, it is important to include information from both partners. While some researchers have used qualitative methods for this, there is growing emphasis on the development and use of appropriate quantitative methods.

The model tested in this analysis is shown in figure 46 below.

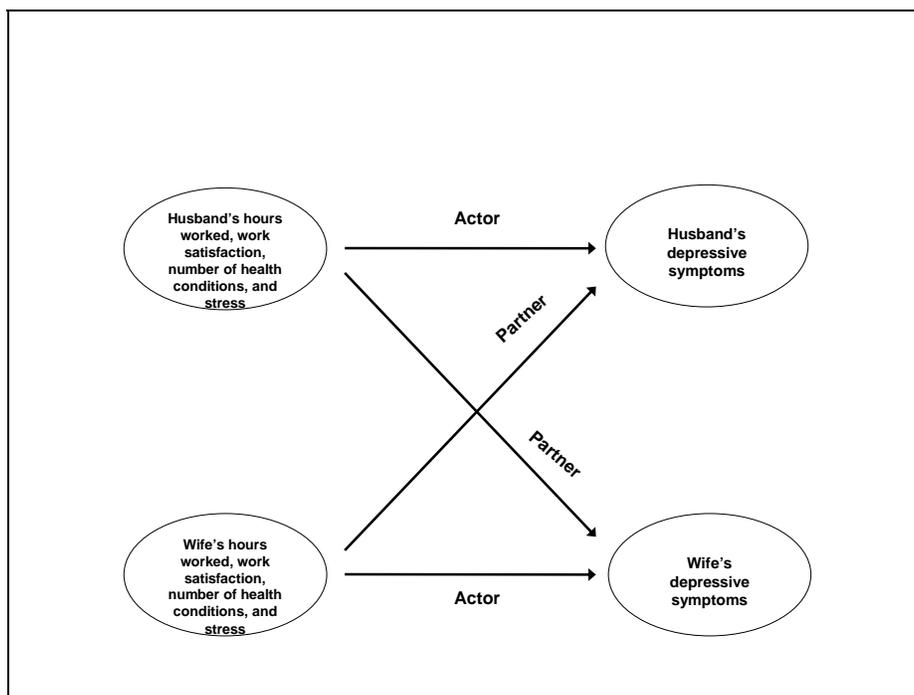


Figure 46. APIM Model

Notice that the husband's work hours, satisfaction with work, number of health conditions, and stress influence not only his own depressive symptoms score but also that of his wife, and the same is true for her independent contribution not only to her own depressive symptoms but also to her husband's.

The Actor-Partner Interdependence Model is a versatile tool for family research because it can be used not only for couples, but for other family and social relationship (e.g., friends, parent and child dyads, etc.). The regression method uses multilevel modeling and accounts for pairing within dyads. These models can include between-dyad, within-dyad, and mixed variables. Between-dyad variables are those for which both members have the same value. In the model being tested here, household income is a between-dyad factor. A within-dyad variable is one in which each member of the pair has a different value but each dyad has the same total score. In this model, the sex of the participant is a within-dyad variable. Finally, a mixed variable is one that varies across members of the dyad without the condition that the total score across the two members is the same. For this APIM analysis, mixed variables include hours worked on farm, satisfaction with work, number of health conditions, perceived stress, and age.

APIM can be estimated assuming the general case of indistinguishable dyads, or a more specific methodology of distinguishable dyads can be used if applicable. An indistinguishable dyad is one in which the two members of the dyad do not have a feature that distinguishes them objectively. An example of this type of design would be a study of college roommates sharing dorm space (presumably these would be same-sex), or a study of same-sex couples. In these cases, since the sex of each member of the dyad is the same, it is impossible to use this as a distinguishing feature. This situation is contrasted to the current study, which is comprised of husbands and wives. Thus, while the general case of indistinguishable dyads can be applied to this study of older farm couples, it is also of interest to see how the model becomes more specific in light of the ability to distinguish between the members of the couples.

The data for this APIM analysis were taken from Wave 2 of this longitudinal study, since depressive symptoms were first assessed at this wave. The sample consisted of 494 rural couples, with each participant aged 50 or above at baseline.

For each of the two models developed (i.e., the general case of indistinguishable dyads and the more specific case of distinguishable dyads), several personal characteristics were included in addition to the predictor variables. Each model contained age, race, gender, and household income in addition to work patterns, satisfaction with work, stress, and health status.

#### Results: General case of indistinguishable dyads.

As shown in Table 42, satisfaction with farm work, number of health conditions, and perceived stress all exhibited significant actor effects. Respondents with high work satisfaction had lower depressive symptoms, while those with many health conditions and high perceived stress had higher scores on the depressive symptoms instrument (CES-D). Age was predictive of depressive symptoms as well, with older age predictive of higher depressive symptoms scores.

Table 42. APIM model to determine predictors of depressive symptoms\*

Variable	Actor effect t (p-value)	Partner effect t (p-value)
Hours worked in the last week	-0.03 (1.0)	2.6 (.01)
Satisfaction with farm work	-3.5 (.0005)	-0.3 (.8)
Number of health conditions	5.6 (< .0001)	-1.3 (.2)
Perceived stress	15.4 (< .0001)	4.1 (< .0001)

\*age, race, gender, and income included in the model; only age was a significant predictor.

In addition to these actor effects (i.e., how the scores on the independent variable measures predict one's own depressive symptoms score), there were two partner effects: participants whose partner worked more hours in the last week had higher depressive symptoms scores than those whose partner worked fewer; and participants whose partner had a greater level of perceived stress had higher depressive symptoms than those whose partner was less stressed.

#### Results: Specific case of distinguishable dyads.

Since farm couples have a characteristic that distinguishes the members of a pair (namely the sex of the participant) we can further specify the model. The influence of personal characteristics, including sex, race, age and household income can be estimated for the group as a whole in this distinguishable dyad context. The actor and partner effect of mixed variables (including work hours, work satisfaction, health status and perceived stress in this model) can be estimated for husbands and wives separately.

As in the indistinguishable dyads case, age was predictive of depressive symptoms in this model ( $p = .05$ ). Being older was predictive of higher depressive symptoms. Depressive symptoms score was not predicted by sex, race or household income. Below is a summary of the significant actor and partner effects in this distinguishable dyads setting:

- The hours worked by husbands predicted wives' CES-D scores through a significant partner effect ( $p = .002$ ); wives whose husbands worked more hours had higher depressive symptoms scores compared with those women whose husbands worked less;
- Wives' satisfaction with farm work predicted their own CES-D through a significant actor effect ( $p = .003$ ); women with higher work satisfaction had lower depressive symptoms scores;
- The number of husbands' health conditions predicted their own CES-D through a significant actor effect ( $p = .002$ ); men with more health problems had higher CES-D scores compared to men with fewer health conditions;
- Similarly, the number of health conditions reported by wives predicted their own CES-D scores through an actor effect ( $p < .0001$ ); women with more health problems had higher depressive symptoms scores compared to farm wives with fewer health problems;
- The number of wives' health conditions predicted husbands' CES-D scores through a partner effect ( $p = .0008$ ); husbands whose wives had more health problems had lower depressive symptoms scores than those whose wives were more healthy.
- Husbands' perceived stress predicted their own CES-D scores through an actor effect ( $p < .0001$ ) and predicted their wives' CES-D scores through a partner effect ( $p = .04$ ); men with higher stress had higher depressive symptoms themselves and their wives did also, whereas men with lower stress had lower CES-D scores, as did their wives.
- Similarly, wives' perceived stress predicted their own CES-D scores through an actor effect ( $p < .0001$ ) and their husbands' CES-D scores through a partner effect ( $p = .001$ ); women with higher perceived stress had higher depressive symptoms themselves and their husbands did also, whereas women with lower stress had lower CES-D scores, as did their husbands.

Summary of findings of indistinguishable dyad model. Respondents who were more satisfied with farm work, had fewer health conditions and less perceived stress had lower depressive symptoms scores. Participants whose partners reported they themselves worked fewer hours on the farm and had less perceived stress had lower CES-D scores than those whose partners were working more hours and were experiencing more stress.

Summary of findings of distinguishable dyad model. There are consistencies with the indistinguishable dyad case, and some instances where the relationships for husbands and wives differed from each other in the distinguishable dyads model. Wives who were more satisfied with their farm work had lower depressive symptoms scores, but this relationship was not significant for husbands. Husbands with fewer

health conditions had lower CES-D scores, and this was true for wives as well (women with fewer health conditions had lower CES-D scores). Wives with lower perceived stress had lower depressive symptoms scores and this was true for husbands also (men with lower perceived stress had lower CES-D scores). Wives whose husbands reported they worked fewer hours had lower CES-D scores than those married to men who worked more; this relationship was not significant between the hours a wife worked and her husband's CES-D score. Perceived stress demonstrated a partner effect for both husbands and wives: when one spouse was stressed, the depressive symptoms score of the other was higher and vice versa. An interesting finding was that the more health problems the wife reported, the lower the CES-D score of her husband; this relationship was not significant between men's health problems and their wives' CES-D scores.

Conclusions from the APIM analysis of the older farmer data. There is a clear link between health conditions, work satisfaction and perceived stress on the level on the level of depressive symptoms experienced by older farmers. Spouses of older farmers also influence the depressive symptoms score of their husband or wife, depending on the number of hours they work, their perceived stress and the number of health problems they have. These results underscore the influence members of the couple have on each other's mental health. The findings suggest that mental health interventions targeted at older rural dwellers may be bolstered by including both members of farm couples, if applicable.

### **John Henryism Self-efficacy**

The John Henry self-efficacy scale contains 12 items that measure the degree to which persons feel that they can control their environment through hard work and determination (James et al., 1987). Items are based on the three themes of efficacious mental and physical vigor; a commitment to hard work; and a single-minded determination to achieve one's goals items. Mean and median scores on the JHAC12 have supported the hypothesis that African Americans experience higher levels of John Henryism. James and colleagues, in one of the early studies of the correlation between John Henryism and hypertension, found that African Americans had significantly higher age-adjusted John Henryism scores than Whites. This racial difference persisted even after controlling for education, marital status, and life satisfaction. Three illustrative items are: "I've always felt that I could make of my life pretty much what I wanted to make of it..."; "When things don't go the way I want them to, that just makes me work even harder..."; and "In the past even when things got really tough, I never lost sight of my goals..."

Older farmers were asked to complete the John Henry Scale to estimate each participant's self-efficacy at Wave 2 and Wave 4. Respondents were asked to rate how true each statement was about themselves at that time, with responses ranging from *completely true* (1) to *completely untrue* (4). The individual items are displayed in Appendix A wave two survey, questions 29a-l. The total John Henryism score was determined by summing the numerical values from all 12 items. The maximum scale score was 48; the minimum was 12. The John Henry hypothesis was that marginalized groups such as African Americans will have higher John Henryism scores. A total of 1,044 older farmers in the sample completed the JHAC12. Cronbach's alpha was 0.81. Factor analysis and mean comparisons supported the construct validity of the instrument.

#### *Self-efficacy at Wave 2*

The average JHS score was 40.8 (SD = 4.6), with a range of 26-48. There were baseline differences in JHS score, both among race/gender groups and also among age cohorts. In particular, the main effect of race/gender class was significant ( $F = 4.1, p = .007$ ), and this was also true for the one-way model that contained the main effect of age cohort ( $F = 3.8, p = .01$ ). The post hoc analysis indicated that for the race/gender model, Black men had significantly higher self-efficacy compared with the remaining three race/gender groups and that all other pairwise comparisons were not significant (see Figure 47). The post hoc analysis for the significant one-way model with age cohort as the class variable demonstrated that compared with 60-69 and 70-79, those in the 50-59 age category at baseline had significantly lower JHS

scores; all other pairwise comparisons among the age categories on Wave 2 self-efficacy were not significant (see Figure 48).

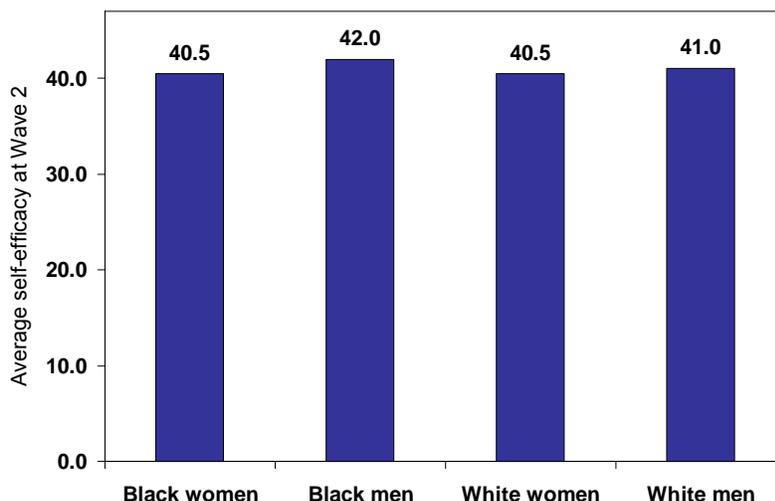


Figure 47. Average Self-efficacy (John Henry Scale) by race/gender

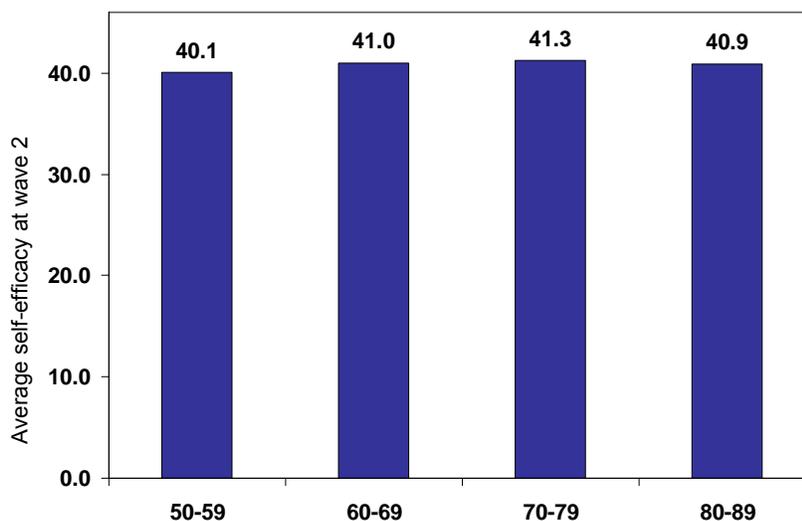


Figure 48. Average Self-efficacy (John Henry scale) by age cohort

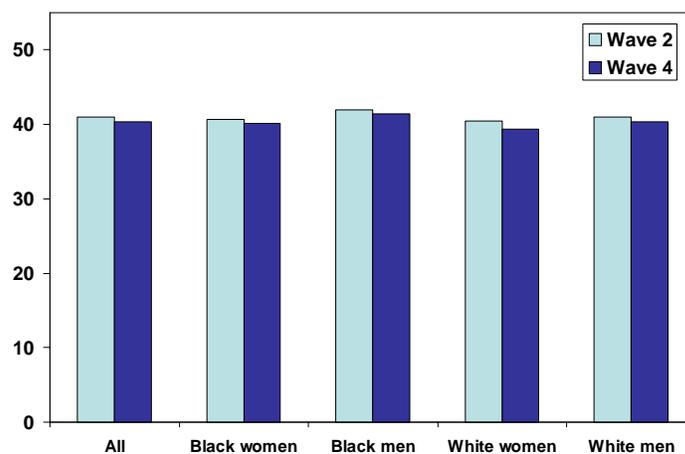
### *Changes in Self-efficacy Score over Time*

The average JHS score decreased from Wave 2 to Wave 4 ( $F = 30.8, p < .0001$ ).

For the comparison of changes over time among the race/gender groups, the main effect of Gender/race was significant ( $F = 7.5, p < .0001$ ; see Figure 27). The main effect of Time was also significant ( $F = 13.5, p = .0002$ ), while the interaction between Gender/race and Time was not. The post hoc analysis of the Gender/race main effect demonstrated that Black men had higher self-efficacy scores compared to the other three race/gender groups and also that White men had higher self-efficacy scores than White women. The time main effect demonstrated a significant decline between Wave 2 and Wave 4. Figure 49

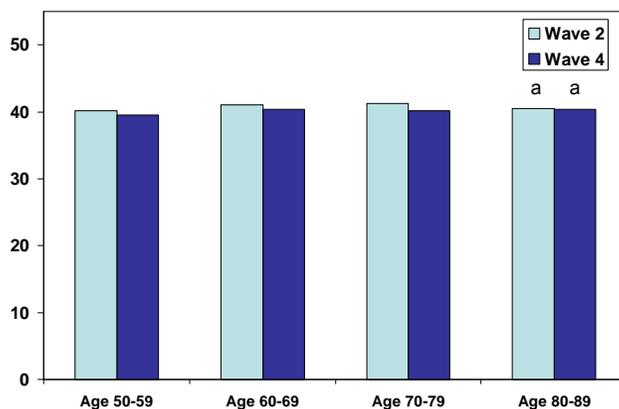
displays the average self-efficacy scores for each combination of Race/gender and Time, but the post hoc analysis of these interaction levels is not warranted since the interaction effect itself was not significant.

For the comparison of changes over time among the age cohorts, the repeated measures model indicated that the main effect of Time was significant ( $F = 4.9, p = .03$ ) as was the main effect of Age cohort ( $F = 3.5, p = .02$ ). The interaction between Time and Age was not significant. The post hoc analysis of the main effect of time revealed a significant decrease from Wave 2 to Wave 4 for the entire group of subjects, while the main effect of Age cohort was due to increased JHS scores for the 60-69 and 70-79 cohorts relative to the younger and older ones. Figure 50 shows the mean scores for each combination of Time and Age, but the post hoc analysis of the time by age interaction is not warranted since the interaction effect was not significant in the model.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 49. Average John Henryism scale over time, for the entire sample and by race/gender category.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 50. Average self-efficacy (John Henry) over time, by age cohort

## Injury

For each round of surveys an identical set of injury questions was asked. In order to streamline the survey, queries were made only about six serious injuries, thus the injury estimates provided here are very

conservative estimates of all injuries sustained by older farmers. The subject was asked: “In the past 12 months (or period since the last survey) did you have a cut that required stitches, a reaction from the use of a chemical, a burn, a broken bone, the loss of a finger or other extremities, or any other injury, such as sprains or strains?” Each individual category was coded as a “yes” or “no.” If the subject answered “yes” an additional question asked if the injury was because of farm work. For this analysis the participant was allowed to age across time. For example, if the participant was 59 upon entry into the study, s/he was aged into the 60-69 age category for wave two, which occurred one year later. This adjustment reflects a more valid portrayal of age related injury.

A total of 757 individuals completed the injury questions in all four waves of surveys, yielding 3,028 observations. Based on this complete longitudinal data set, the resultant injury rates are presented in Tables 43-46. A grand total of 620 injuries was recorded. Of these, males reported slightly more injuries than females (373 compared to 247, respectively). Sprains/other comprised the leading cause of injury (56%), with sprains and strains comprising an average of 65% of the “other” category. Cuts and broken bones contributed almost one-third of the injuries. One out of 11 injuries was due to burns, while reactions to chemicals and amputations contributed about 5% of the total.

Surprisingly, 44.4% of all the reported injuries were farm related. Sprains and other injuries comprised the bulk of reported injuries. When examined by age group and gender there are differences noted. For cuts and chemicals, the oldest age groups of males and females exhibited the highest rates of injury. The highest rates of sprains/other were reported by the youngest group, ages 50-59, in both genders.

As expected, male farm related injury rates surpass those of females by nearly a four-fold margin. In the overall sample the youngest age group (50-59) exhibited the highest injury rate (13.9), significantly higher than the older age groupings. There were no differences in injury risk by race, state of residence, or survey wave. As expected, there was an increasing gradient of risk by work time exposure; those who worked more than 20 hours per week on the farm had twice the chance of injury compared to those who worked 1-10 hours per week. Better health status was associated with greater risk of injury, perhaps reflective of the “healthy worker” effect.

Table 43. Distribution of injuries in male older farmers by type of injury, farm-relatedness of injury, and age group

Gender / Age Group	N	Cuts		Chemicals			Burns		
		Rate <sup>1</sup>	%Farm	N	Rate	%Farm	N	Rate	%Farm
Male									
50-59 years	7	3.1	29	1	0.5	100	14	6.3	50
60-69 years	29	5.1	52	6	1.1	100	8	1.4	50
70 years and older	44	7.1	48	8	1.3	63	5	0.8	60
Total	80	5.7	48	15	1.1	80	27	1.9	52
Broken Bones									
Loss of Fingers									
Sprains/Other									
Gender / Age Group	N	Rate <sup>1</sup>	%Farm	N	Rate	%Farm	N	Rate	%Farm
Male									
50-59 years	5	2.2	80	1	0.5	0	56	25.1	82
60-69 years	15	2.6	53	2	0.4	50	90	15.7	73
70 years and older	11	1.8	64	2	0.3	100	69	11.2	67
Total	31	2.2	61	5	0.4	60	215	15.2	73

<sup>1</sup> Injury rate per 100 farmers per years in the complete cohort for the specified type of injury. Farm-related is the proportion of the injuries that were due to farm work.

Table 44. Distribution of injuries in female older farmers by type of injury, farm-relatedness of injury, and age group

Gender / Age Group	Cuts			Chemicals			Burns		
	N	Rate <sup>1</sup>	%Farm	N	Rate	%Farm	N	Rate	%Farm
Female									
50-59 years	4	1.2	0	2	0.6	50	7	2.1	0
60-69 years	23	3.4	26	3	0.4	67	12	1.8	8
70 years and older	16	4.0	0	4	1.0	25	11	2.8	9
Total	43	3.0	14	9	0.6	44	30	2.1	7
Gender / Age Group	Broken Bones			Loss of Fingers			Sprains/Other		
	N	Rate <sup>1</sup>	%Farm	N	Rate	%Farm	N	Rate	%Farm
Female									
50-59 years	7	2.1	29	0	0	0	47	14.0	49
60-69 years	14	2.0	14	2	0.3	100	52	7.6	31
70 years and older	9	2.3	0	1	0.3	0	33	8.3	30
Total	30	2.1	13	3	0.2	67	132	9.3	37

<sup>1</sup> Injury rate per 100 farmers per years in the complete cohort for the specified type of injury. Farm-related is the proportion of the injuries that were due to farm work.

Table 45. Farm injury counts and rates in the injured farmer cohort (N=757) by gender, age group, and wave

Gender / Age Group	Wave 1		Wave 2		Wave 3		Wave 4		Total	
	N	Rate <sup>1</sup>	N	Rate	N	Rate	N	Rate	N	Rate
Male										
50-59 years	18	25.4	13	22.0	10	19.6	11	26.2	52	23.3
60-69 years	26	16.2	21	14.1	22	16.3	17	13.1	86	15.0
70 years and older	16	12.5	14	9.9	23	13.9	21	11.2	74	11.9
Total	60	16.7	48	13.7	55	15.6	49	13.6	212	14.9
Female										
50-59 years	5	5.0	7	7.7	6	7.7	8	11.9	26	7.7
60-69 years	8	4.6	7	4.1	5	2.9	5	3.0	25	3.6
70 years and older	2	2.4	3	3.2	4	3.7	3	2.5	12	3.0
Total	15	4.2	17	4.8	14	4.2	16	4.5	63	4.4

<sup>1</sup> Farm-related injury rate per 100 farmers per years in the complete cohort.

Table 46. Bivariate analysis of farm injuries in older farmer cohort

Characteristic	Number of farm injuries	Rate	Odds Ratio	95% CI
<b>Gender</b>				
Male	212	14.9	3.80	2.81-5.14
Female	63	4.4	1.00	----
<b>Age group</b>				
50-59 years	78	13.9	1.77	1.26-2.48
60-69 years	111	8.8	1.05	0.80-1.37
70 years and older	86	8.4	1.00	----
<b>Race</b>				
White	212	9.2	1.00	----
Black	57	11.7	1.31	0.95-1.81
Other	5	18.5	2.25	0.74-6.36
<b>Work status</b>				
More time	35	15.9	3.06	1.82-5.17
Same time	181	10.4	1.87	1.27-2.75
Half as much time	22	9.5	1.69	0.94-3.03
Much less time	36	5.8	1.00	----
<b>Work hours</b>				
<1 hour per week	34	3.6	1.00	----
1-10 hours per week	76	9.4	2.77	1.79-4.29
11-20 hours per week	54	12.4	3.79	2.37-6.00
> 20 hours per week	111	16.8	5.43	3.58-8.25
<b>State</b>				
Kentucky	237	9.5	1.00	----
S. Carolina	38	10.8	1.15	0.79-1.68
<b>Wave</b>				
1	75	10.5	1.17	0.81-1.68
2	65	9.2	1.01	0.69-1.47
3	70	9.8	1.09	0.75-1.58
4	65	9.1	1.00	----
<b>Health status</b>				
Excellent	25	13.0	3.65	1.70-7.92
Very Good	55	9.7	2.64	1.34-5.28
Good	121	12.8	3.58	1.90-6.93
Fair	62	7.5	1.98	1.02-3.94
Poor	12	3.9	1.00	----

### *Specific Aim # 2*

*Develop exposure profiles for tasks related to agricultural work of older farmers.*

### **Farm Work**

#### **Farm Tasks**

A checklist of 23 potential farm tasks was included as part of the survey at baseline and Wave 3. At baseline, the questionnaire asked whether the respondent had performed each task in the last year, and another column of the survey asked whether the study participant had performed each task in the last 5

years. The Wave 3 questionnaire asked whether each task had been performed in the last year only. The farm tasks included both physical and administrative jobs, such as mowing fields and tilling ground (physical), and tasks with more of an administrative component, including paying farm bills, doing farm bookkeeping, and running farm errands. The summary scores were formed by adding the number of items checked by each person, with one summary for the entire scale and two additional subscales based on the physical and administrative jobs. Potential scores for the total scale ranged from 0-23, while the administrative subscale had a potential range from 0-5 and the physical subscale had a potential score range from 0-18.

### *Farm Tasks at Baseline*

The average number of total farm tasks performed in the last 5 years reported by the participants at baseline was 10.2 (SD = 5.9), with a range from 1-23. The average number of administrative tasks in the prior 5 years at baseline was 3.7 (SD = 1.3), with a range from 1 to 5 while the mean number of physical tasks in the prior 5 years at baseline was 7.5 (SD = 4.5), with a range from 1-18.

As expected, the average number of total farm tasks reported in the last year as of the baseline interview was a little lower. The mean number of total farm tasks in the last year at baseline was 9.5 (SD = 5.6), and the number ranged from 0-22. The mean number of administrative farm tasks performed in the last year as of the baseline interview was 3.6 (SD = 1.3), with a range from 0-5. The average number of physical farm tasks performed in the last year as reported at baseline was 6.8 (SD = 4.2), and the range was from 0-17.

### *Comparisons of Baseline Total Tasks among Subgroups*

There were differences in the baseline total number of farm tasks performed in the last year by race/gender group and by age cohort. As shown in Figure 51, women performed fewer tasks compared with men. The F-test for the one-way ANOVA comparing these four groups on number of farm tasks at baseline was significant ( $F = 197.0, p < .0001$ ). The post hoc analysis indicated that there was no difference in average number of farm task between Black men and White men, but the rest of the comparisons were significant: Black women performed fewer tasks than all three remaining groups; both Black men and White men performed more tasks in the past year than either group of women, and White women indicated more tasks than Black women but fewer than either group of men.

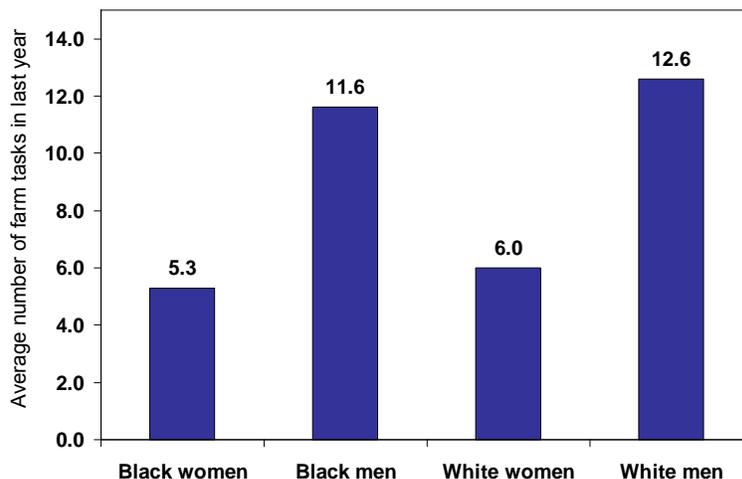


Figure 51. Average number of farm tasks in the past yr by race/gender, at baseline

The baseline comparison of the number of farm tasks performed in the past year among the age cohorts indicated a significant age effect ( $F = 5.8, p = .0007$ ). The post hoc analysis demonstrated that all of the pairwise group comparisons were significant at the .05 level, with the exception of the difference between the 60-69 and 70-79 age groups (see Figure 52).

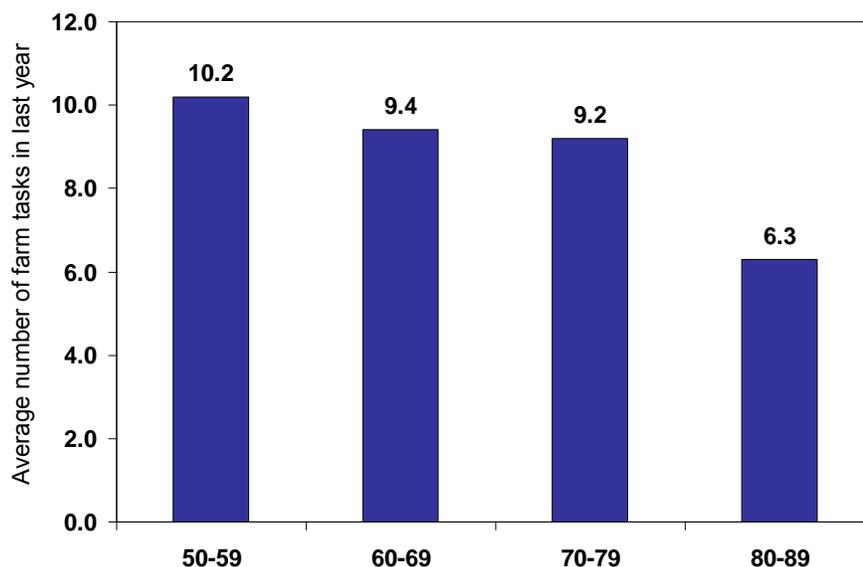
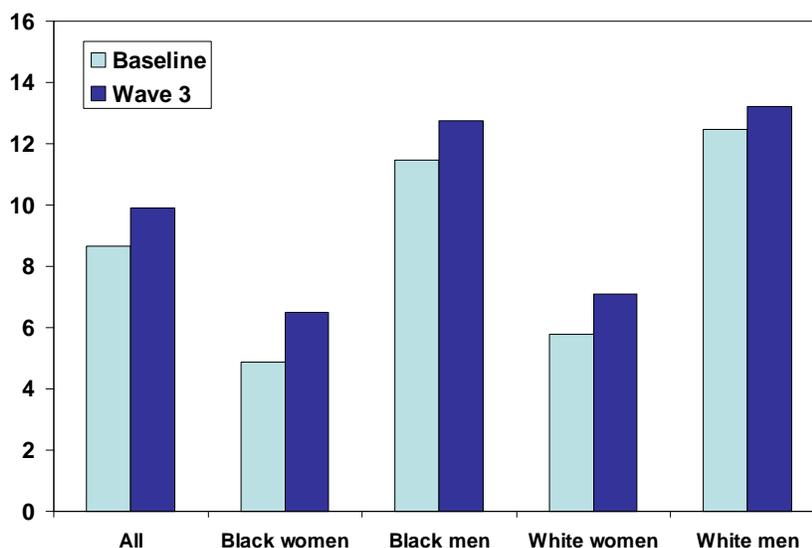


Figure 52. Average number of farm tasks in the past yr by age cohort, at baseline

### *Changes in Total Farm Tasks over Time*

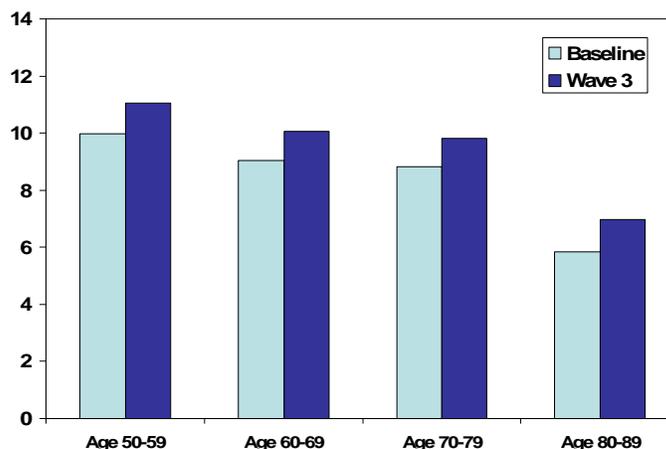
The total number of farm tasks performed in the past year was assessed at baseline and then again at Wave 3. The repeated measures ANOVA model comparing baseline to Wave 3 for the full group of participants demonstrated a significant Time effect ( $F = 59.4, p < .0001$ ), with an increase in the number of tasks over time. The repeated measures model with race/gender added as a factor demonstrated significant main effects for Time ( $F = 45.9, p < .0001$ ) and Race/gender ( $F = 228.7, p < .0001$ ), but the interaction effect between them was not significant (see Figure 7). Post hoc analysis of the main effects demonstrated a significant increase from baseline to Wave 3 across all race/gender groups combined. In addition, the post hoc analysis of the main effect of race/gender indicated that Black men and White men did not differ on average scores and this was also true of the comparison of Black women and White women. On the other hand, all other pairwise comparisons were significant at the .05 level (e.g., Black men vs. White women, Black women vs. White men, Black men vs. Black women, and White men vs. White women; for each of these comparisons, men had significantly more tasks compared with women). While the group means are shown for each timepoint in Figure 53, there were no comparisons made between Baseline and Wave 3 for the individual race/gender groups since the interaction effect was not significant (so post hoc analysis for the interaction term is not warranted).



Note: Means with the same letter within each group are not significantly different at  $\alpha=.05$ .

Figure 53. Average number of tasks in last year, for the entire sample and by race/gender category.

Like the model with Race/gender as a factor, the two-way model with Time and Age and their interaction demonstrated significant main effects ( $F = 16.9, p < .0001$  for Time and  $F = 7.8, p < .0001$  for Time and Race/gender, respectively) while the interaction was not significant (Figure 8). The main effect of time again indicated that the number of tasks performed in the past year was higher at Wave 3 than at baseline. The pairwise post hoc comparisons of the Age main effect demonstrated that each of the age cohorts was significantly different with every other age cohort on number of tasks performed at the two waves with the exception of the comparison of the age 60-69 and age 70-79 groups. The post hoc comparisons for the interaction effect were not considered since the overall interaction was not significant, but there was a trend in a decreasing number of tasks reported with increasing age (as shown in Figure 54).



Note: Means with the same letter within each group are not significantly different at  $\alpha=.05$ .

Figure 54. Average number of farm tasks 1 year over time, by age cohort at Baseline

### Comparisons of Baseline Number of Administrative Tasks among Subgroups

There were differences in the number of administrative tasks at baseline by gender/race ( $F = 34.7, p < .0001$ ) and by age cohort ( $F = 5.8, p = .0007$ ). The post hoc analysis for the gender/race comparisons indicated that all of the pairwise comparisons were significant except that Black men and White men did not differ, and similarly Black women and White women did not differ on the number of administrative tasks. In particular, both groups of women were significantly lower on these types of tasks compared with both groups of men (see Figure 55).

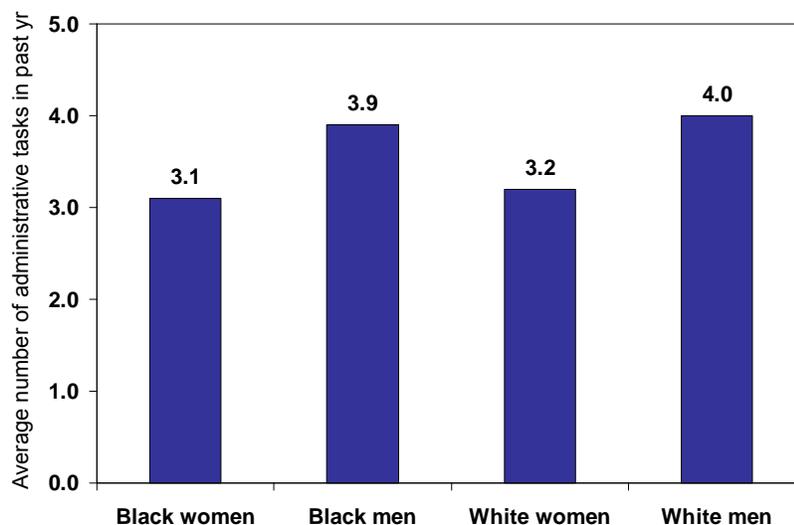


Figure 55. Average number of administrative tasks in past year by race/gender

The post hoc analysis for the age cohorts and average number of administrative tasks in the past year (as reported as baseline) suggested that the average number for the 50-59 year cohort was significantly greater ( $M = 3.9$ ) compared with any of the other cohorts and that all of the other pairwise comparisons were not significant (Figure 56).

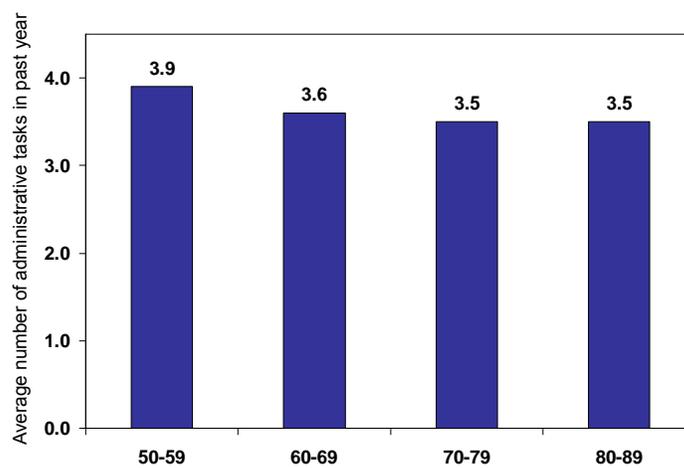
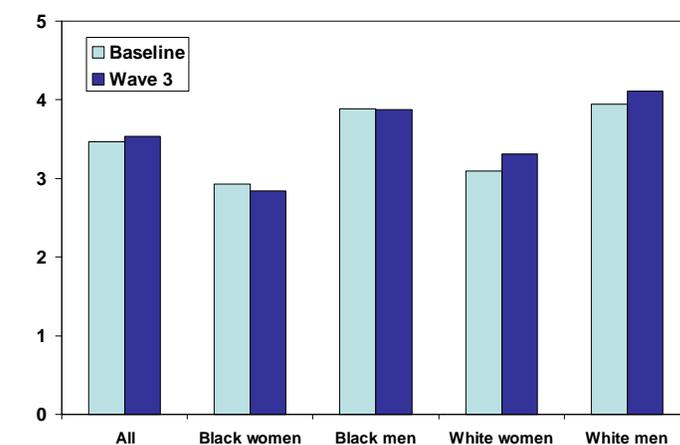


Figure 56. Average number of administrative tasks in past year by age cohort

### *Changes in Number of Administrative Farm Tasks over Time*

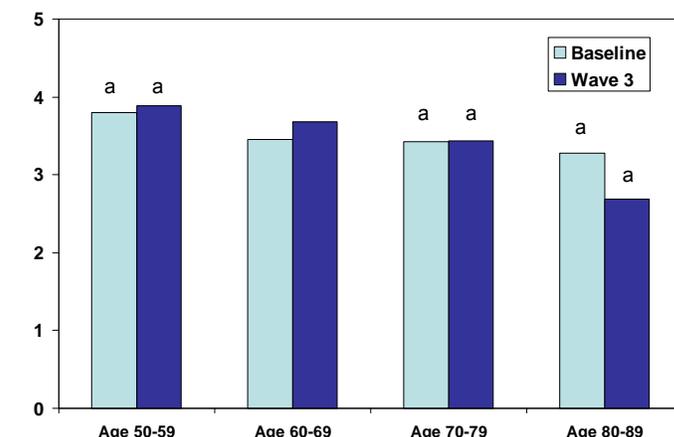
The total number of administrative farm tasks performed in the past year was assessed at baseline and then again at Wave 3. As with the total number of farm tasks, there was an increase in the number of administrative tasks between baseline and Wave 3 ( $F = 6.7, p = .01$ ). With Race/gender added as a factor to the repeated measures analysis (see Figure 57), only the main effect of race/gender was significant – the main effect of time and the interaction between time and race/gender were not. The post hoc analysis of the race/gender main effect demonstrated that Black men and White men did not differ from each other on average number of administrative tasks, with these two groups reporting the largest mean number, while the other pairwise comparisons were significant. The Figure below displays the mean number of administrative tasks for each subgroup at each timepoint, but post hoc comparisons were not made among all these groups since the interaction effect was not significant in the model.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 57. Average number of administrative tasks 1 year over time, for the entire sample and by race/gender category.

For the repeated measures model that contained age cohort as a class variable, the interaction between Time and Age cohort was significant ( $F = 3.0, p = .03$ ). The post hoc analysis indicated that the relationship between age cohort and number of tasks of this type was inverse, with fewer tasks reported by the older cohorts. In addition, all of the age cohorts with the exception of 60-69 did not have a significant change in number of administrative tasks over time between baseline and Wave 3. The subgroup that was 60-69 at baseline had a significant increase in the number of this type of task by Wave 3. Other cohort comparisons from baseline to Wave 3 were not significant (see Figure 58).



Note: Means with the same letter within each group are not significantly different at alpha=.05.

Figure 58. Average number of administrative farm tasks in the past year, by age cohort

*Comparisons of Baseline Number of Physical Tasks among Subgroups*

There were differences in the number of physical tasks at baseline by gender/race ( $F = 146.4, p < .0001$ ), but not by age cohort ( $F = 2.5, p = .06$ ). The post hoc analysis for the gender/race comparisons indicated that all of the pairwise comparisons were significant except that Black women and White women did not differ. All of the other post hoc comparisons, including the one between Black men and White men were significant at the .05 level (see Figure 59). Consistent with the other farm task measures, women performed fewer physical tasks compared with men.

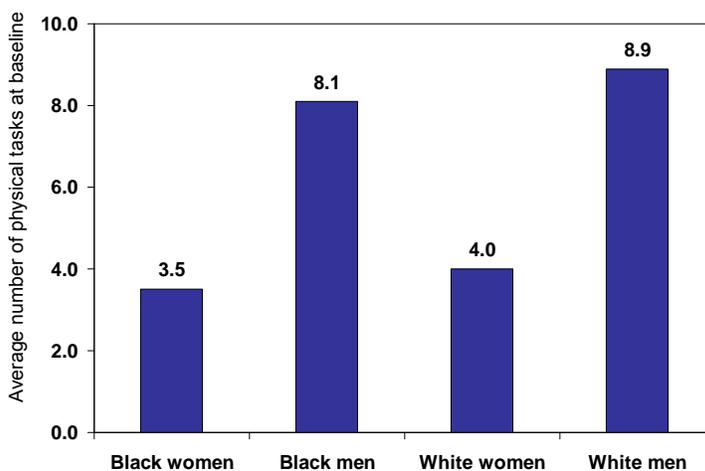


Figure 59. Average number of physical tasks in the past yr by race/gender

Interestingly, the overall difference in number of physical farm tasks among the four age cohorts was not significant, suggesting that the decline in the number of physical tasks was less pronounced than either the decline in the administrative tasks and the decline in the total number of farm tasks (administrative + physical). Figure 60 displays the means for each age cohort subgroup, but these means were not compared in the post hoc analysis since the main effect of age cohort was not significant as it pertained to physical tasks.

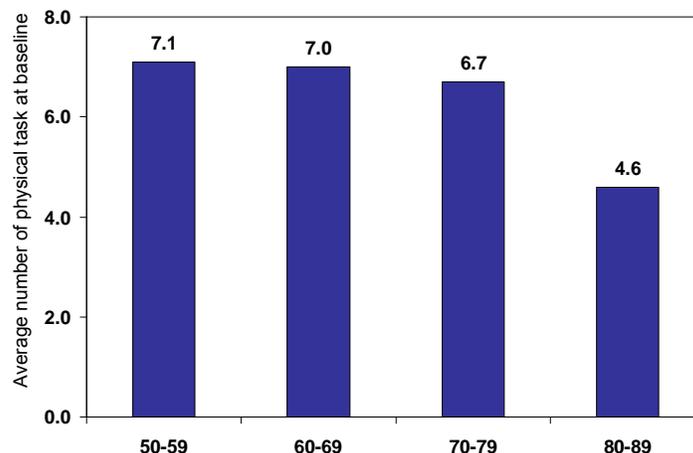
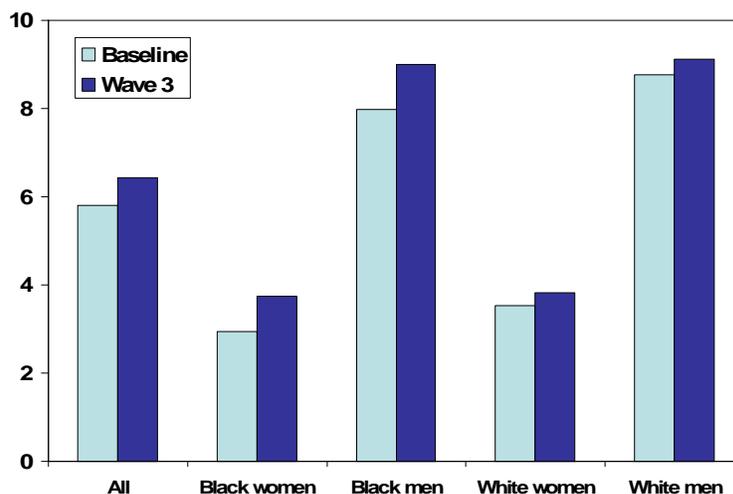


Figure 60. Average number of physical tasks in the past yr by age cohort

### *Changes in Number of Physical Farm Tasks over Time*

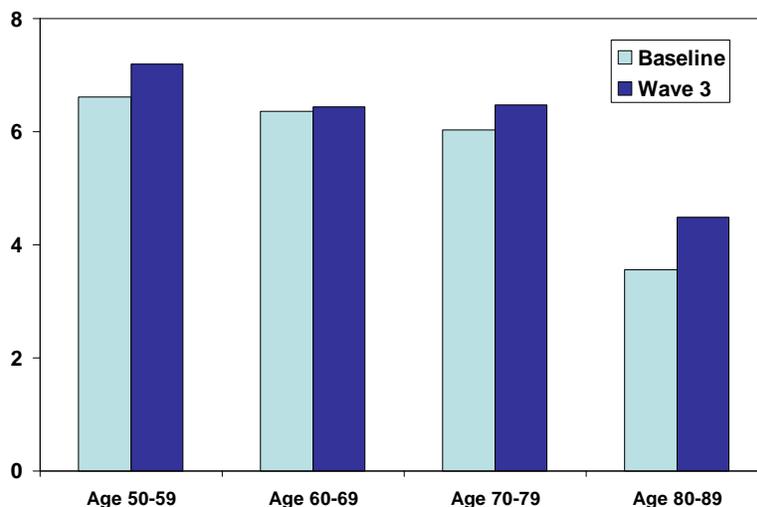
The total number of physical farm tasks performed in the past year was assessed at baseline and then again at Wave 3. As with the total number of farm tasks and the number of administrative tasks, there was an increase in the number of administrative tasks between baseline and Wave 3 ( $F = 8.9, p = .003$ ). With Race/gender added as a factor to the repeated measures analysis (see Figure 15), both the main effect of time and the main effect of race/gender were significant ( $F = 14.7, p = .0001$  and  $F = 233.5, p < .0001$ , respectively); the interaction between time and race/gender was not significant. The post hoc analysis indicated a significant increase in the number of physical tasks between baseline and Wave 3. In addition, the post hoc pairwise comparisons for the race/gender factor indicated that all group comparisons were significant except those between Black men and White men and Black women and White women. These findings, consistent with the other summary scores for farm tasks, suggest that men performed significantly more physical labor tasks compared with women. Figure 61 below displays the means for each race/gender subgroup at baseline and Wave 3, but the pairwise comparisons were not performed at this level since the interaction effect was not significant in the model.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 61. Average number of physical tasks 1 year over time, for the entire sample and by race/gender category.

For the repeated measures model that contained age cohort as a class variable, the interaction between Time and Age cohort was not significant, but the main effects of time and age cohort were ( $F = 4.6, p = .03$  and  $F = 4.7, p = .003$ , respectively). The change in physical tasks over time was a significant increase from baseline to Wave 3. The post hoc analysis indicated that the relationship between age cohort and number of tasks of this type was inverse, with fewer physical tasks reported by the older cohorts; in particular, the 80-89 year cohort exhibited the most significant differences in average number of physical tasks relative to the remaining cohorts (see Figure 62). The pairwise comparisons were not performed at the level of the interaction between Time and Age cohort since the interaction effect was not significant in the model.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 62. Average number of physical farm tasks 1 year over time, by age cohort at Baseline

## Hours of Farm Work

Respondents were asked to estimate the number of hours in the prior week that they had spent on farm work. This item was asked at Baseline, Wave 3 and Wave 4. Consistent with the number of farm tasks discussed above, women reported fewer hours spent on farm work compared with men.

### *Hours of Farm Work at Baseline*

At baseline, the participants reported spending an average of 13.5 hours per week ( $SD=16.4$ , range 0-98) on farm work and 25.6 ( $SD=19.1$  range 0-100) at an off-farm job. The correlation between the hours spent on farm work and at an off farm job was not significant ( $r=-0.04, p=.3$ ).

There were baseline differences among the race/gender combinations, but not by age cohort in hours spent working on the farm. As shown in Figure 63, the number of work hours at baseline was higher for men than for women, which was true for both Black and White participants. The  $F$  test comparing these four groups on average number of hours worked on the farm was significant ( $F = 85.0, p < .0001$ ), and post hoc pairwise comparisons were made using Fisher's least significance procedure. The post hoc analysis indicated that all of the post hoc comparisons were significant except for that between Black women and White women and the comparison between Black men and White men.

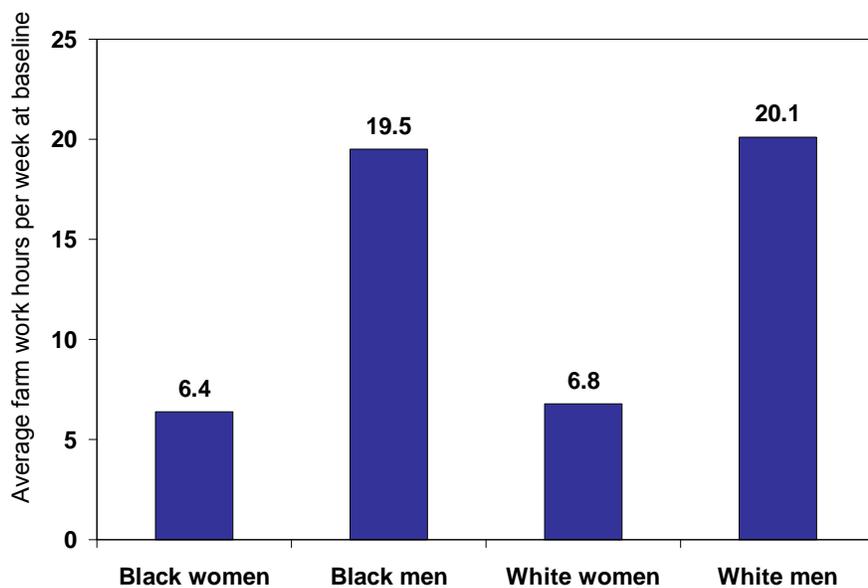


Figure 63. Average farm work hours per week by race/gender

The difference among the age cohorts in number of farm work hours in the prior week was not significant ( $F = 2.5$ ,  $p = .06$ ) (Figure 64). The means are displayed for each of the 4 race/gender groups below, but post hoc pairwise comparisons are not warranted since the overall model was not significant.

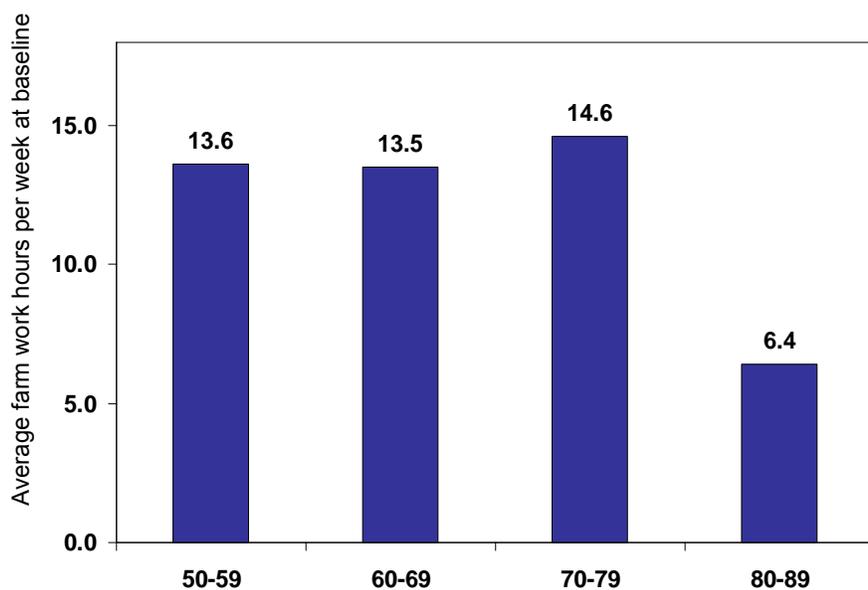
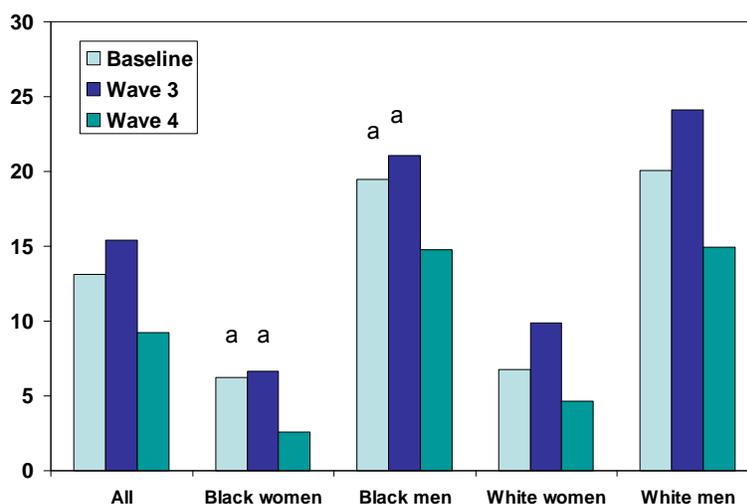


Figure 64. Average farm work hours per week by age cohort

### *Changes in Number of Farm Hours Worked over Time*

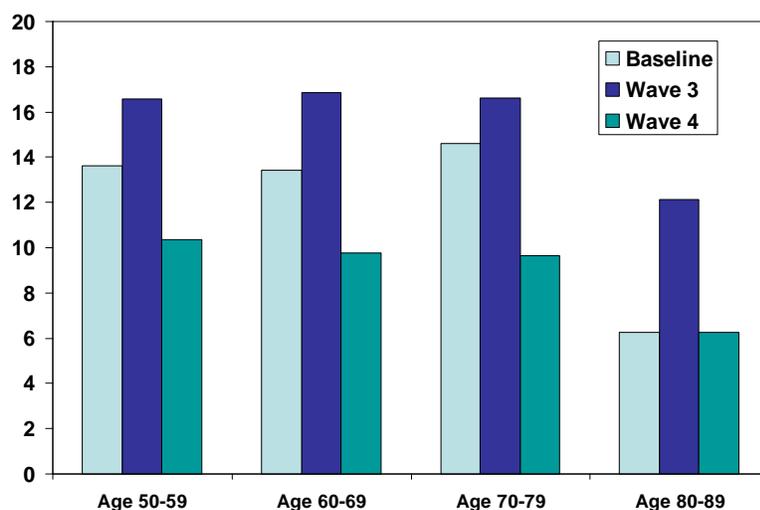
The total number of hours spent performing tasks in the past week was assessed at baseline and then again at Wave 3 and Wave 4. The trajectory of hours spent over time changed significantly from one wave to the next ( $F = 97.8, p < .0001$ ), with an increase from baseline to Wave 3, which was followed by a decrease from Wave 3 to Wave 4.

For the comparison of changes over time among the race/gender groups, the interaction between Race/gender and Time was significant ( $F = 3.4, p = .003$ ; see Figure 65). On the other hand, when comparing the 4 age cohorts over time in the repeated measures model, only the main effect of time was significant ( $F = 24.2, p < .0001$ ; the main effect of age cohort and the interaction between time and age cohort were not). The post hoc analysis for the main effect of time in the model containing that and race/gender categories indicated that the largest difference was between Wave 3 and Wave 4 and also between men and women of either the same race or different races (both sets of comparisons were significant). For the time comparisons within each race/gender group, only baseline and Wave 3 did not differ significantly from each other, and this was only true for Black women and Black men. The post hoc analysis for the main effect of Time in the model that included this factor and age cohort indicated that there was a significant increase in hours spent in the last week from baseline to Wave 3, but also there was a significant decline in work hours from Wave 3 to Wave 4. Figure 66 displays the means for each combination of age cohort and time, but the post hoc analysis was based only on the main effect of time since this was the only significant effect in the model.



Note: Means with the same letter within each group are not significantly different at  $\alpha = .05$ .

Figure 65. Average farm work hours per week over time, for the entire sample and by race/gender category.



Note: Means with the same letter within each group are not significantly different at  $\alpha=.05$ .

Figure 66. Average number of farm work per week over time, by age cohort at Baseline

Participants were asked to specify from a listing of farm tasks which tasks they had performed in the last five years (baseline), in the last week (waves 1 and 3). Analyses of the responses disclosed that the percentage of farmers reporting they had performed the task increased from wave 1 to wave 3 in every task listed. The largest increase was reflected in the administrative activities as opposed to the physical tasks included in the list. The following tables and charts reflect the responses related to farm tasks performed. All results are expressed as percents.

Table 47. Farm tasks across time – overall sample

Farm Tasks Across Time	OVERALL		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Paid farm bills	75.7	71.0	86.3
Run farm errands	72.8	68.4	83.7
Farm bookkeeping	63.5	60.7	75.2
Feed animals	60.6	53.5	62.2
Order farm supplies	60.4	55.7	73.3
Mow fields	54.2	47.1	54.7
Repairs	50.4	47.0	65.4
Made major purchases	45.6	36.7	48.5
Plant crops	45.2	34.4	43.2
Till ground	44.7	34.8	45.8
Climbed > 8 feet	44.2	39.3	41.7
Apply chemicals	43.9	34.1	43.4
Bale hay or straw	42.0	34.1	39.2
Herd animals	41.3	36.3	46.8
Equip on highways	40.9	37.6	42.1
Transport animals	36.0	30.9	38.0
Hand harvest crop	32.2	21.4	28.8
Other veterinarian work	29.2	24.9	32.8
Transport crops	27.9	21.8	29.1
Castrate animals	24.3	18.9	24.8
Combine/picker	8.3	5.0	7.0
Chop silage	5.1	3.0	5.3
Milk animals	4.4	2.0	5.7

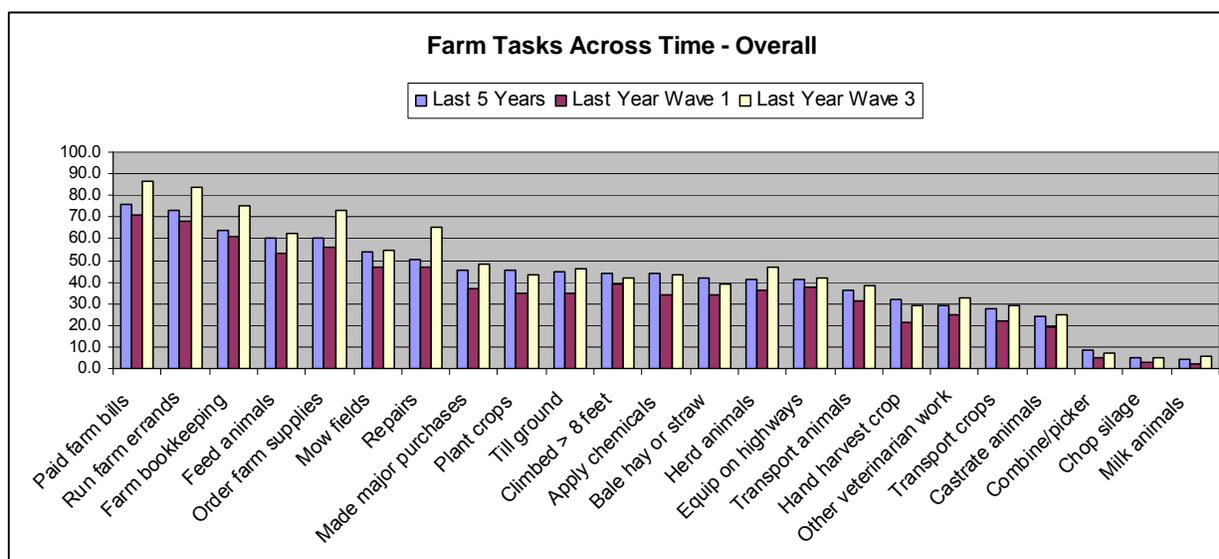


Figure 67. Farm tasks across time - Overall

Table 48. Farm tasks across time – White females

Farm Tasks Across Time	WHITE FEMALES		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Paid farm bills	78.4	67.5	84.0
Run farm errands	70.9	60.3	78.0
Farm bookkeeping	66.0	59.3	75.6
Feed animals	50.2	38.6	50.4
Order farm supplies	46.5	38.4	60.6
Mow fields	27.2	15.5	23.2
Repairs	20.1	14.6	39.8
Made major purchases	22.4	16.2	30.2
Plant crops	31.9	20.3	32.4
Till ground	18.1	11.4	19.2
Climbed > 8 feet	24.6	18.1	23.2
Apply chemicals	24.8	17.9	24.9
Bale hay or straw	23.3	14.4	22.2
Herd animals	34.0	27.8	39.7
Equip on highways	17.0	12.7	16.7
Transport animals	18.8	13.6	19.2
Hand harvest crop	22.0	13.6	19.0
Other veterinarian work	17.5	14.0	19.2
Transport crops	14.4	8.8	14.5
Castrate animals	7.5	5.6	8.0
Combine/picker	0.7	0.6	1.0
Chop silage	2.2	0.7	1.5
Milk animals	3.9	3.2	2.7

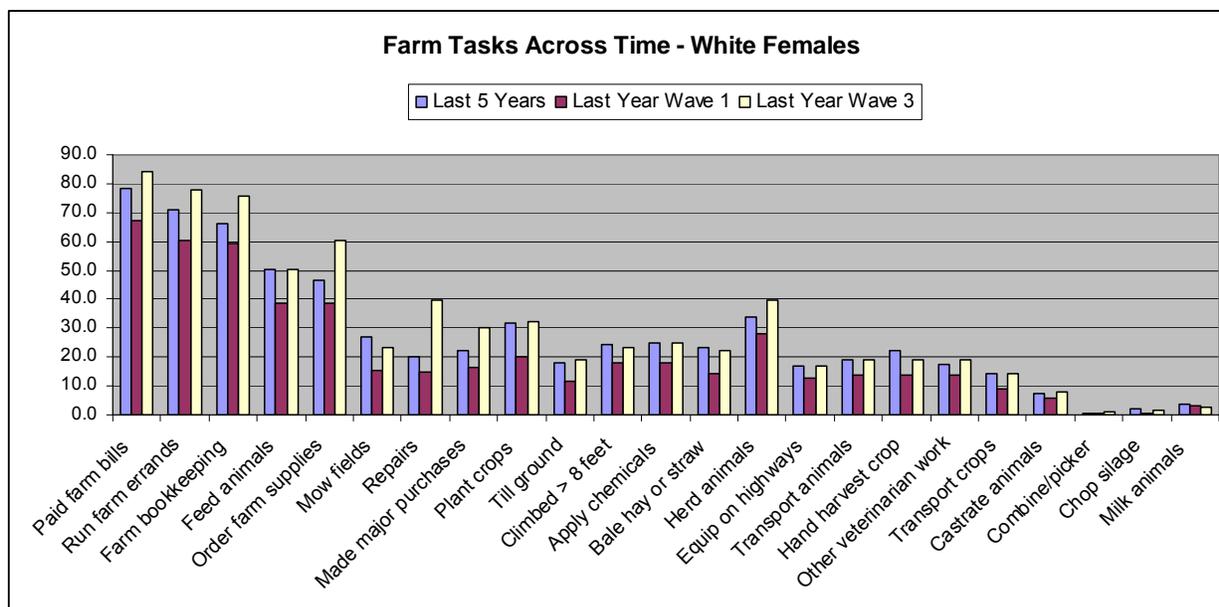


Figure 68. Farm tasks across time – White females

Table 49. Farm tasks across time – Black females

Farm Tasks Across Time	BLACK FEMALES		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Paid farm bills	55.2	48.6	73.6
Run farm errands	55.2	45.7	74.0
Farm bookkeeping	48.6	42.9	61.6
Feed animals	47.6	38.1	50.7
Order farm supplies	33.3	29.5	50.7
Mow fields	16.2	8.6	26.0
Repairs	16.2	11.4	50.7
Made major purchases	27.6	18.1	28.8
Plant crops	36.2	24.8	26.0
Till ground	21.0	12.4	24.7
Climbed > 8 feet	9.5	5.7	11.0
Apply chemicals	21.9	18.1	38.4
Bale hay or straw	9.5	7.6	17.8
Herd animals	18.1	9.5	19.2
Equip on highways	9.5	6.7	16.4
Transport animals	19.0	10.5	15.1
Hand harvest crop	23.8	16.2	24.7
Other veterinarian work	7.6	4.8	12.3
Transport crops	17.1	13.3	19.2
Castrate animals	4.8	3.8	6.8
Combine/picker	2.9	1.0	5.5
Chop silage	1.0	0.0	11.0
Milk animals	1.9	0.0	2.7

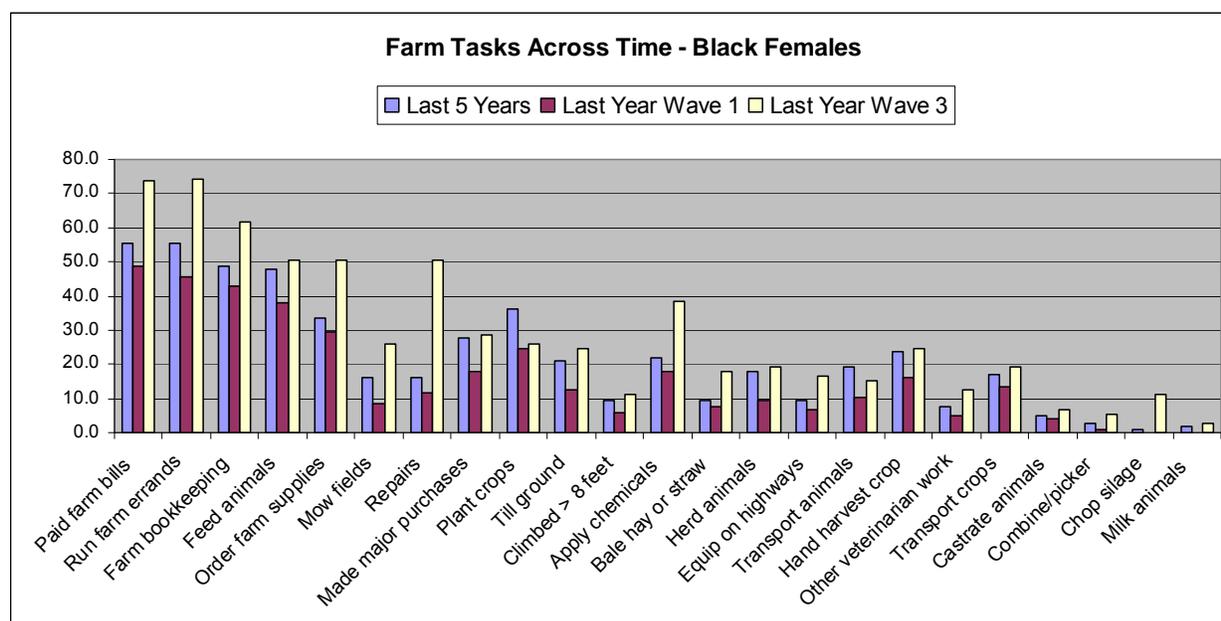


Figure 69. Farm tasks across time – Black females

Table 50. Farm tasks across time – White males

Farm Tasks Across Time	WHITE MALES		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Paid farm bills	78.8	77.7	89.5
Run farm errands	81.7	80.1	90.2
Farm bookkeeping	65.3	64.4	78.8
Feed animals	71.2	67.2	71.8
Order farm supplies	78.8	74.7	87.9
Mow fields	86.7	83.0	86.6
Repairs	81.5	78.2	87.9
Made major purchases	68.6	55.0	67.7
Plant crops	54.6	45.4	49.9
Till ground	69.4	54.1	66.4
Climbed > 8 feet	70.8	65.7	63.6
Apply chemicals	63.7	50.7	56.1
Bale hay or straw	68.1	60.0	61.8
Herd animals	54.2	50.0	57.5
Equip on highways	66.6	62.2	66.9
Transport animals	53.0	48.3	55.3
Hand harvest crop	43.2	29.7	36.2
Other veterinarian work	45.6	39.7	49.7
Transport crops	41.7	35.2	41.6
Castrate animals	41.7	31.0	39.5
Combine/picker	11.3	6.6	9.8
Chop silage	8.5	6.1	8.8
Milk animals	5.4	2.0	9.3

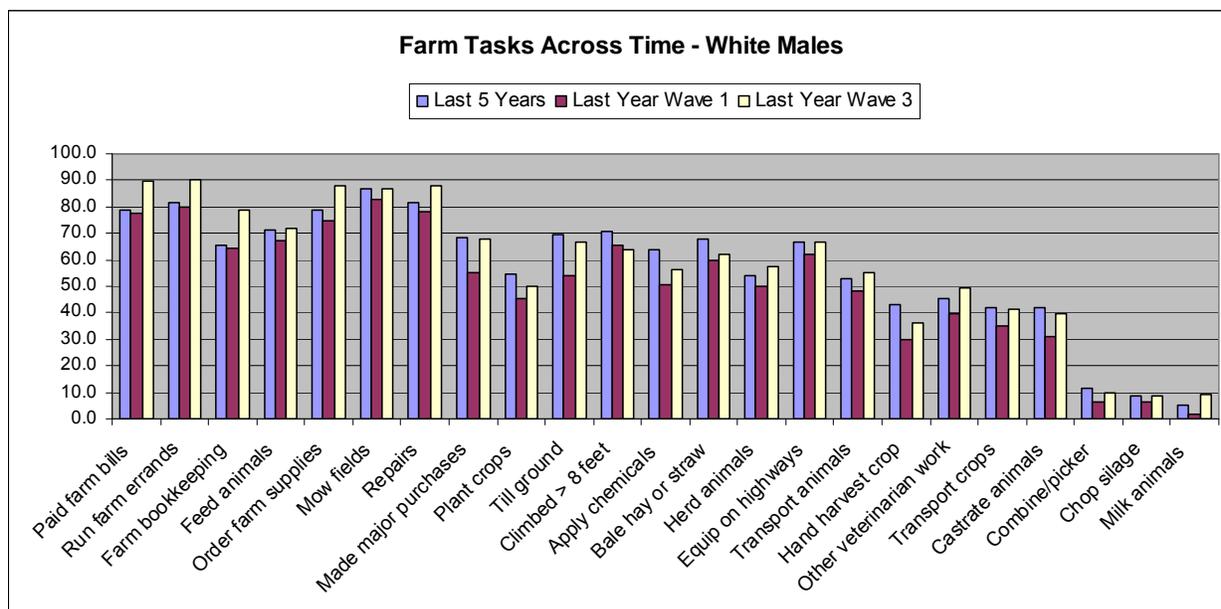


Figure 70. Farm tasks across time – White males

Table 51. Farm tasks across time – Black males

Farm Tasks Across Time	BLACK MALES		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Paid farm bills	69.1	73.6	89.9
Repairs	67.9	71.8	89.0
Run farm errands	60.5	69.9	88.9
Till ground	67.3	62.6	83.5
Order farm supplies	62.3	65.6	82.6
Feed animals	66.0	65.0	77.1
Mow fields	61.1	60.1	76.1
Farm bookkeeping	58.6	63.8	74.3
Plant crops	63.0	50.9	66.1
Apply chemicals	54.9	44.2	66.1
Equip on highways	56.2	58.9	65.1
Made major purchases	57.4	54.0	61.5
Transport animals	46.9	44.2	57.8
Climbed > 8 feet	43.2	43.6	51.4
Herd animals	35.8	35.6	50.5
Castrate animals	34.6	31.9	45.0
Transport crops	32.1	25.8	43.1
Hand harvest crop	33.3	22.1	40.4
Other veterinarian work	27.2	25.2	37.6
Bale hay or straw	39.5	32.5	35.8
Combine/picker	26.5	17.8	21.1
Milk animals	4.9	0.0	3.7
Chop silage	6.8	2.5	1.8

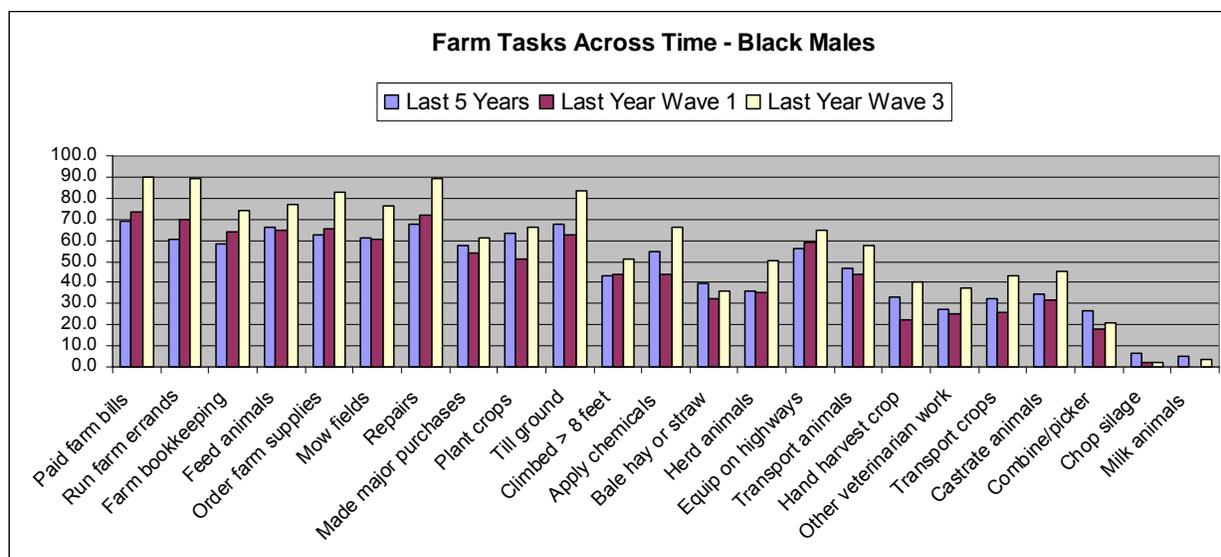


Figure 71. Farm tasks across time – Black males

Table 52. Farm tasks across time – age group 50-59

		Age Group 50-59	
Farm Tasks Across Time	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Run farm errands	79.5	78.8	90.0
Paid farm bills	78.5	79.3	89.3
Farm bookkeeping	69.9	70.7	81.6
Order farm supplies	66.2	65.9	74.5
Feed animals	65.4	59.6	66.0
Mow fields	54.0	48.0	56.7
Plant crops	51.5	39.6	52.8
Repairs	49.5	51.3	65.6
Major purchases	49.5	43.7	52.5
Apply chemicals	49.2	36.9	48.2
Till ground	47.2	39.9	50.0
Climbed > 8 feet	47.2	46.0	47.5
Herd animals	45.7	43.7	47.9
Equip on highways	44.4	45.2	47.5
Bale hay or straw	43.7	36.1	40.8
Transport animals	41.4	35.6	42.2
Hand harvest crop	39.6	25.0	33.3
Other vet work	34.8	31.3	36.2
Transport crops	33.1	24.2	35.5
Castrate animals	25.8	20.2	25.2
Combine/cotton picker	9.6	5.6	6.7
Milk animals	5.3	2.5	4.3
Chop silage	4.5	2.3	3.9

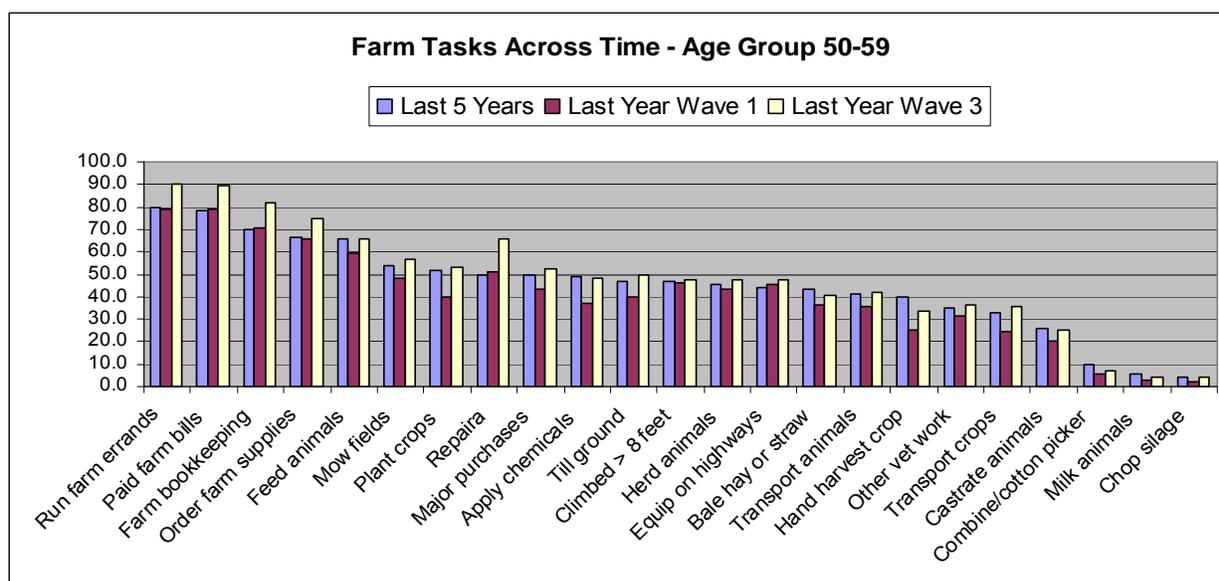


Figure 72. Farm tasks across time – age group 50-59

Table 53. Farm tasks across time – age group 60-69

	<b>Age Group 60-69</b>		
<b>Farm Tasks Across Time</b>	<b>Last 5 Years</b>	<b>Last Year Wave 1</b>	<b>Last Year Wave 3</b>
Run farm errands	72.8	67.2	84.4
Paid farm bills	77.2	69.3	84.8
Farm bookkeeping	63.3	58.8	74.6
Order farm supplies	59.1	51.6	75.6
Feed animals	61.5	54.2	63.6
Mow fields	52.9	45.4	53.3
Plant crops	46.0	35.4	41.4
Repairs	50.7	45.8	63.6
Major purchases	43.4	33.8	49.3
Apply chemicals	42.9	35.4	41.6
Till ground	44.2	33.6	43.5
Climbed > 8 feet	45.6	37.8	39.7
Herd animals	40.7	34.5	49.2
Equip on highways	40.9	35.6	42.3
Bale hay or straw	42.2	34.3	38.8
Transport animals	36.3	31.9	38.3
Hand harvest crop	30.5	22.1	27.3
Other vet work	29.0	25.0	32.6
Transport crops	28.6	23.4	27.0
Castrate animals	24.6	18.6	25.6
Combine/cotton picker	9.7	6.0	6.5
Milk animals	4.2	2.0	4.5
Chop silage	5.3	3.3	4.5

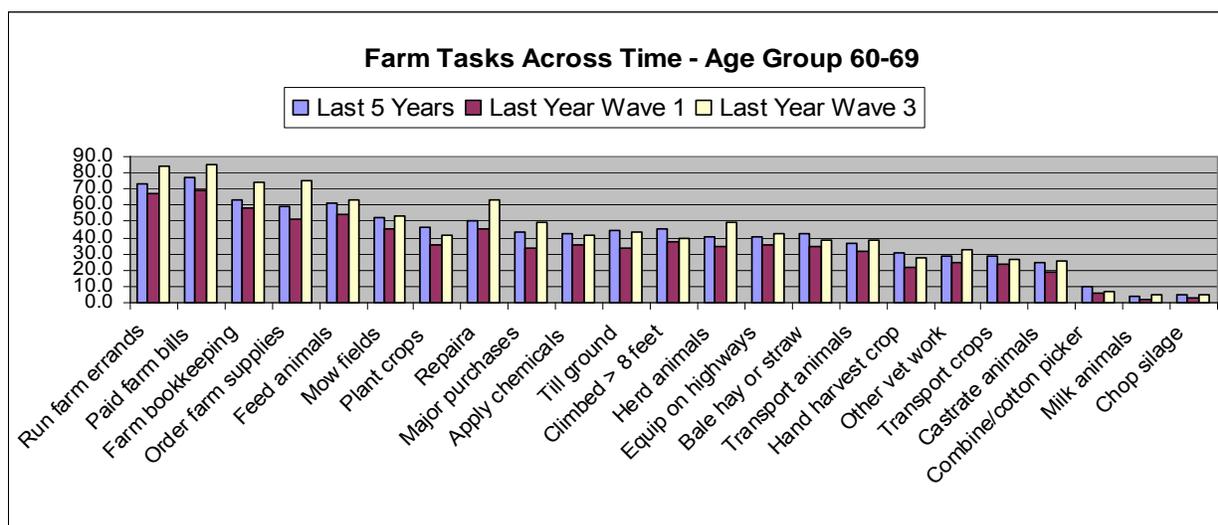


Figure 73. Farm tasks across time – Age group 60-69

Table 54. Farm tasks across time – age group 70-79

Farm Tasks Across Time	Age Group 70-79		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Run farm errands	67.6	63.1	77.1
Paid farm bills	72.5	67.4	85.2
Farm bookkeeping	58.1	54.2	68.4
Order farm supplies	58.1	55.0	69.2
Feed animals	57.2	49.3	56.7
Mow fields	58.4	53.0	57.5
Plant crops	39.9	30.0	36.8
Repairs	54.0	48.7	69.1
Major purchases	46.2	35.2	45.3
Apply chemicals	42.5	32.9	42.1
Till ground	44.2	34.3	46.6
Climbed > 8 feet	42.5	38.3	39.6
Herd animals	40.2	34.3	43.7
Equip on highways	41.0	36.3	36.8
Bale hay or straw	42.5	35.2	38.5
Transport animals	31.8	26.8	34.0
Hand harvest crop	29.8	18.7	26.3
Other vet work	26.3	19.9	31.6
Transport crops	23.1	19.0	25.1
Castrate animals	23.7	19.3	25.1
Combine/cotton picker	5.5	3.5	8.1
Milk animals	3.8	1.4	8.1
Chop silage	6.1	4.0	8.5

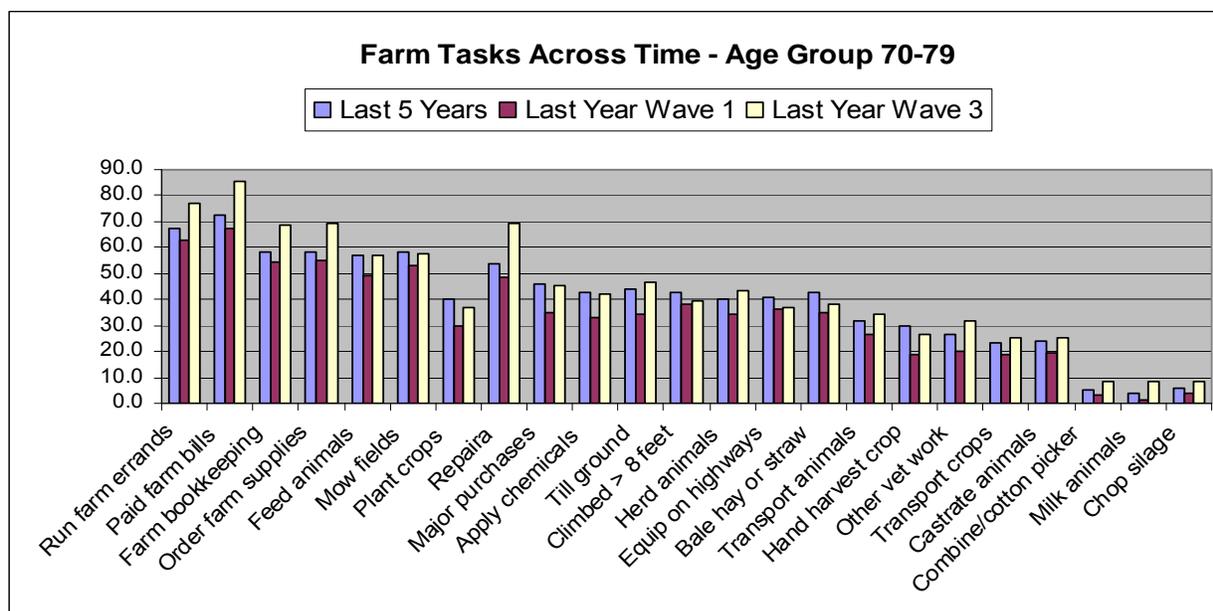


Figure 74. Farm tasks across time – Age group 70-79

Table 55. Farm tasks across time – age group 80-89

Farm Tasks Across Time	Age Group 80-89		
	Last 5 Years	Last Year Wave 1	Last Year Wave 3
Run farm errands	56.1	36.6	60.9
Paid farm bills	65.9	53.7	82.6
Farm bookkeeping	61.0	48.8	69.6
Order farm supplies	56.1	34.1	60.9
Feed animals	41.5	26.8	47.8
Mow fields	41.5	26.8	30.4
Plant crops	26.8	12.2	17.4
Repairs	43.9	29.3	47.8
Major purchases	41.5	34.1	17.4
Apply chemicals	29.3	12.2	30.4
Till ground	41.5	14.6	30.4
Climbed > 8 feet	29.3	22.0	30.4
Herd animals	26.8	17.1	30.4
Equip on highways	17.1	12.2	26.1
Bale hay or straw	24.4	14.6	26.1
Transport animals	22.0	12.2	30.4
Hand harvest crop	9.8	2.4	13.0
Other vet work	12.2	9.8	13.0
Transport crops	14.6	7.3	21.7
Castrate animals	17.1	12.2	17.4
Combine/cotton picker	7.3	4.9	8.7
Milk animals	2.4	0.0	13.0
Chop silage	0.0	0.0	4.3

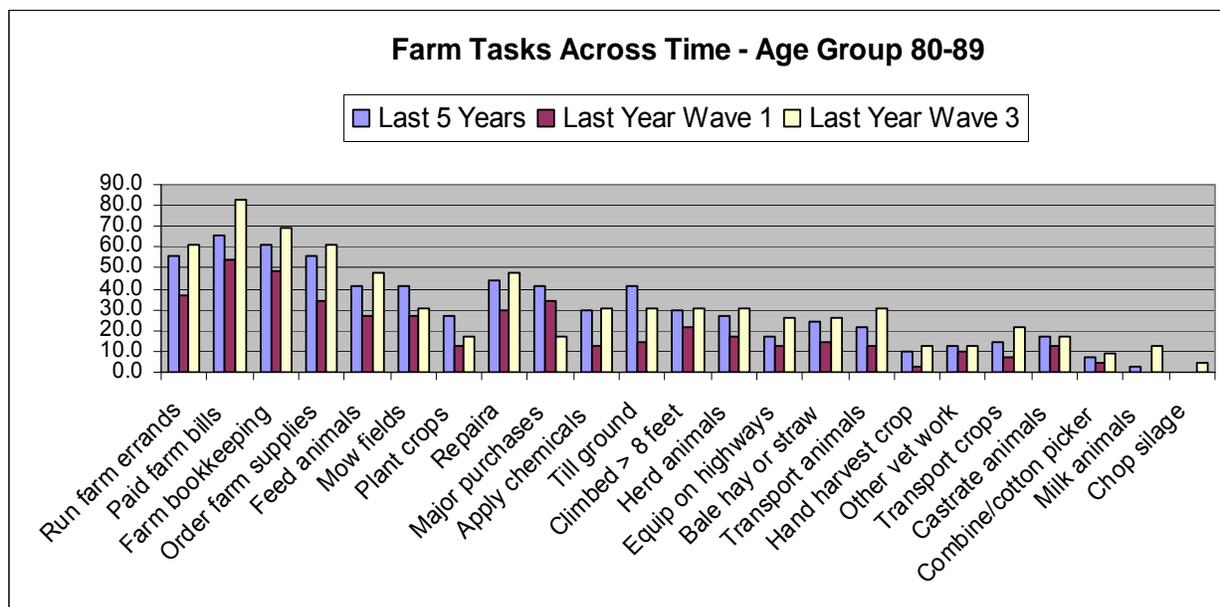


Figure 75. Farm tasks across time – Age group 80-89

Table 56. Top 10 Farm Tasks – Baseline (Last 5 Years)

Overall		White Females		Black Females		White Males		Black Males	
Paid farm bills	75.7	Paid farm bills	78.4	Paid farm bills	55.2	Mow fields	86.7	Paid farm bills	69.1
Run farm errands	72.8	Run farm errands	70.9	Run farm errands	55.2	Run farm errands	81.7	Repair	67.9
Farm bookkeeping	63.5	Farm bookkeeping	66.0	Farm bookkeeping	48.6	Repair	81.5	Till ground	67.3
Feed animals	60.6	Feed animals	50.2	Feed animals	47.6	Paid farm bills	78.8	Feed animals	66.0
Order farm supplies	60.4	Order farm supplies	46.5	Plant crops	36.2	Order farm supplies	78.8	Plant crops	63.0
Mow fields	54.2	Herd animals	34.0	Order farm supplies	33.3	Feed animals	71.2	Order farm supplies	62.3
Repairs	50.4	Plant crops	31.9	Major purchases	27.6	Climbed > 8 feet	70.8	Mow fields	61.1
Major purchases	45.6	Mow fields	27.2	Hand harvest crop	23.8	Till ground	69.4	Run farm errands	60.5
Plant crops	45.2	Apply chemicals	24.8	Apply chemicals	21.9	Major purchases	68.6	Farm bookkeeping	58.6
Till ground	44.7	Climbed > 8 feet	24.6	Till ground	21.0	Bale hay or straw	68.1	Major purchases	57.4

Table 57. Top 10 Farm Tasks – Wave 3

Overall		White Females		Black Females		White Males		Black Males	
Paid farm bills	86.3	Paid farm bills	84.0	Run farm errands	74.0	Run farm errands	90.2	Paid farm bills	89.9
Run farm errands	83.7	Run farm errands	78.0	Paid farm bills	73.6	Paid farm bills	89.5	Repairs	89.0
Farm bookkeeping	75.2	Farm bookkeeping	75.6	Farm bookkeeping	61.6	Order farm supplies	87.9	Run farm errands	88.9
Order farm supplies	73.3	Order farm supplies	60.6	Order farm supplies	50.7	Repairs	87.9	Till ground	83.5
Repairs	65.4	Feed animals	50.4	Feed animals	50.7	Mow fields	86.6	Order farm supplies	82.6
Feed animals	62.2	Repairs	39.8	Repairs	50.7	Farm bookkeeping	78.8	Feed animals	77.1
Mow fields	54.7	Herd animals	39.7	Apply chemicals	38.4	Feed animals	71.8	Mow fields	76.1
Major purchases	48.5	Plant crops	32.4	Major purchases	28.8	Major purchases	67.7	Farm bookkeeping	74.3
Herd animals	46.8	Major purchases	30.2	Plant crops	26.0	Equipment on highways	66.9	Plant crops	66.1
Till ground	45.8	Apply chemicals	24.9	Mow fields	26.0	Till ground	66.4	Apply chemicals	66.1

Table 58. Top 10 Farm Tasks – Comparison between Baseline and Wave 3

<b>Overall Baseline</b>		<b>Wave 3</b>	
Paid farm bills	75.7	Paid farm bills	86.3
Run farm errands	72.8	Run farm errands	83.7
Farm bookkeeping	63.5	Farm bookkeeping	75.2
Feed animals	60.6	Order farm supplies	73.3
Order farm supplies	60.4	Repairs	65.4
Mow fields	54.2	Feed animals	62.2
Repairs	50.4	Mow fields	54.7
Major purchases	45.6	Major purchases	48.5
Plant crops	45.2	Herd animals	46.8
Till ground	44.7	Till ground	45.8
<b>White Females Baseline</b>		<b>Wave 3</b>	
Paid farm bills	78.4	Paid farm bills	84.0
Run farm errands	70.9	Run farm errands	78.0
Farm bookkeeping	66.0	Farm bookkeeping	75.6
Feed animals	50.2	Order farm supplies	60.6
Order farm supplies	46.5	Feed animals	50.4
Herd animals	34.0	Repairs	39.8
Plant crops	31.9	Herd animals	39.7
Mow fields	27.2	Plant crops	32.4
Apply chemicals	24.8	Major purchases	30.2
Climbed > 8 feet	24.6	Apply chemicals	24.9
<b>Black Females Baseline</b>		<b>Wave 3</b>	
Paid farm bills	55.2	Run farm errands	74.0
Run farm errands	55.2	Paid farm bills	73.6
Farm bookkeeping	48.6	Farm bookkeeping	61.6
Feed animals	47.6	Order farm supplies	50.7
Plant crops	36.2	Feed animals	50.7
Order farm supplies	33.3	Repairs	50.7
Major purchases	27.6	Apply chemicals	38.4
Hand harvest crop	23.8	Major purchases	28.8
Apply chemicals	21.9	Plant crops	26.0
Till ground	21.0	Mow fields	26.0
<b>White Males Baseline</b>		<b>Wave 3</b>	
Mow fields	86.7	Run farm errands	90.2
Run farm errands	81.7	Paid farm bills	89.5
Repair	81.5	Order farm supplies	87.9
Paid farm bills	78.8	Repairs	87.9
Order farm supplies	78.8	Mow fields	86.6
Feed animals	71.2	Farm bookkeeping	78.8
Climbed > 8 feet	70.8	Feed animals	71.8
Till ground	69.4	Major purchases	67.7
Major purchases	68.6	Equip. on highways	66.9
<i>Bale hay or straw</i>	68.1	<i>Till ground</i>	66.4

(continued)

Table 58. Top 10 Farm Tasks – Comparison between Baseline and Wave 3 (continued)

<b>Black Males Baseline</b>		<b>Wave 3</b>	
Paid farm bills	69.1	Paid farm bills	89.9
Repair	67.9	Repairs	89.0
Till ground	67.3	Run farm errands	88.9
Feed animals	66.0	Till ground	83.5
Plant crops	63.0	Order farm supplies	82.6
Order farm supplies	62.3	Feed animals	77.1
Mow fields	61.1	Mow fields	76.1
Run farm errands	60.5	Farm bookkeeping	74.3
Farm bookkeeping	58.6	Plant crops	66.1
Major purchases	57.4	Apply chemicals	66.1

Table 59. Farm tasks across time by type of activity

<b>Farm Tasks Across Time - Overall Sample</b>		<b>Last 5 Years</b>	<b>Last Year Wave 1</b>	<b>Last Year Wave 3</b>
<i>Animal Activities</i>	Feed animals	60.6	53.5	62.2
	Mow fields	54.2	47.1	54.7
	Herd animals	41.3	36.3	46.8
	Transport animals	36.0	30.9	38.0
	Other veterinarian work	29.2	24.9	32.8
	Castrate animals	24.3	18.9	24.8
	Milk animals	4.4	2.0	5.7
<i>Crop Activities</i>	Plant crops	45.2	34.4	43.2
	Till ground	44.7	34.8	45.8
	Apply chemicals	43.9	34.1	43.4
	Bale hay or straw	42.0	34.1	39.2
	Hand harvest crop	32.2	21.4	28.8
	Transport crops	27.9	21.8	29.1
	Combine/picker	8.3	5.0	7.0
	Chop silage	5.1	3.0	5.3
<i>Management Activities</i>	Paid farm bills	75.7	71.0	86.3
	Farm bookkeeping	63.5	60.7	75.2
	Order farm supplies	60.4	55.7	73.3
	Made major purchases	45.6	36.7	48.5
	Run farm errands	72.8	68.4	65.4
	Repairs	50.4	47.0	41.7
	Climbed > 8 feet	44.2	39.3	42.1
	Equip on highways	40.9	37.6	

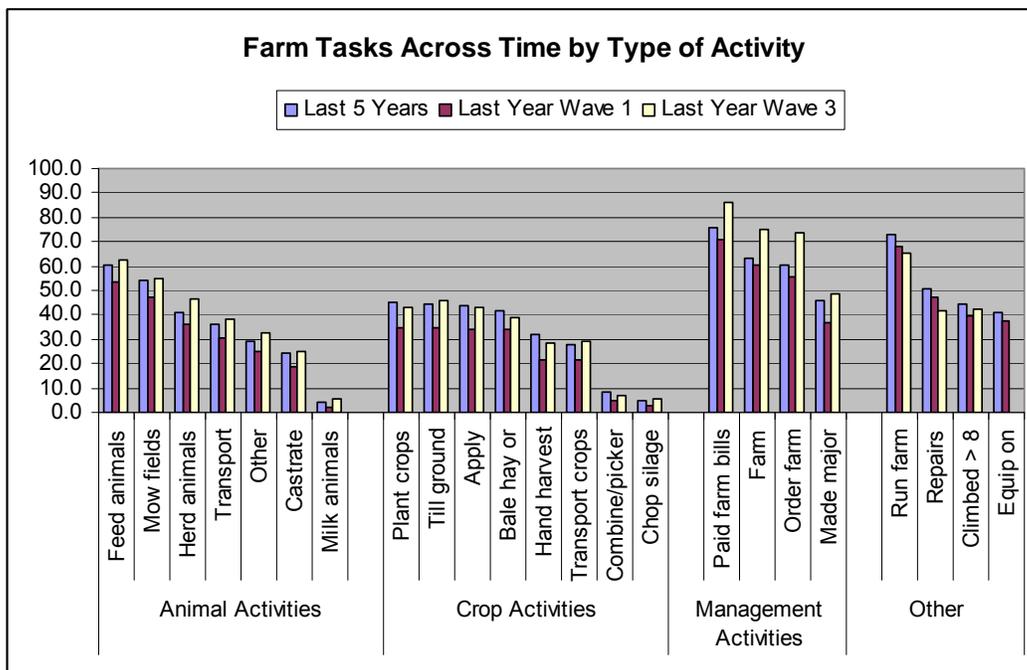


Figure 76. Farm tasks across time by type of activity

Farm work generally peaks in summer and early fall, reflective of the crop growing season. In order to capture seasonal variation, the survey waves were spaced as much as possible to reflect these episodic work times. Wave 1 began in late September 2002. Most of the data collection occurred in January and February, 2003 when the telephone surveys took place. Wave three occurred June – August, 2004 and Wave 4 followed in February through April 2005. As expected, hours increased during the reporting time in Wave 3. Except for the oldest age group, by Wave four the hours of every group decreased from the hours reported at baseline.

Table 60. Mean hours worked on farm in the last week by age group

	<u>Overall</u>	<u>50-59</u>	<u>60-69</u>	<u>70-79</u>	<u>80-89</u>
Wave 1	13.5	13.6	13.5	14.7	6.4
Wave 3	16.9	16.8	17.3	16.6	13.1
Wave 4	10.1	11.0	9.8	10.0	8.1

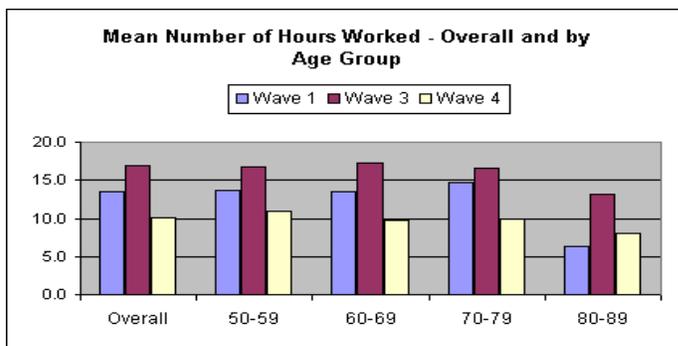


Figure 77. Mean number of hours worked – Overall and by age group

Table 61. Mean hours worked on farm in the last week by race and gender

	<u>Overall</u>	<u>Black Males</u>	<u>Black Females</u>	<u>White Males</u>	<u>White Females</u>
Wave 1	13.5	19.5	6.4	20.1	6.8
Wave 3	16.9	21.8	7.5	24.5	10.1
Wave 4	10.1	15.1	3.0	15.6	4.5

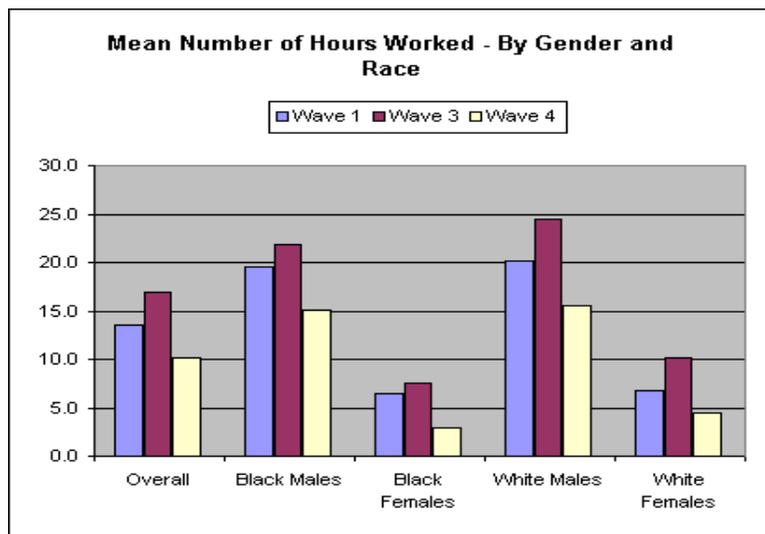


Figure 78. Mean number of hours worked – by gender and race

**Perspectives on Retirement** (these analyses also address Aims 3-4)

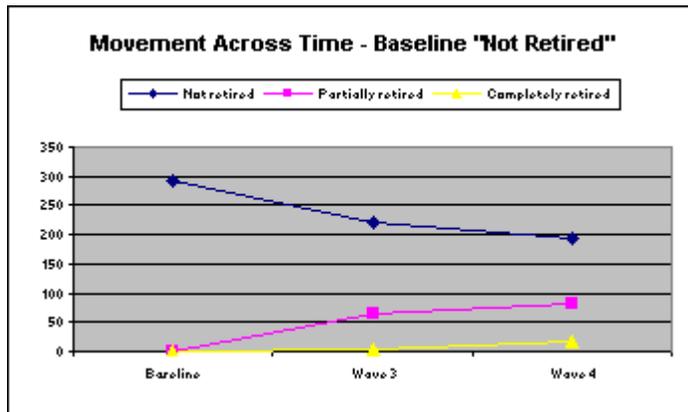
Respondents of our study were asked three questions as to how they define their relationship to farming and their responses underscore the assertion by others that farmers are reluctant to consider retirement. Nearly one third (34.6%) of the total sample self-identified themselves as “not retired”. Yet when asked to compare how much time they spend on farm work now as opposed to a year ago, over half (57%) of the total sample state “about the same amount of time” with no significant difference among the different age groups. One in ten of the total sample said they were actually spending “more time” on farm work now.

The figure below highlights the work movement over time of farmers in our sample. Respondents who answered all three waves of retirement data collection (Waves 1, 3 and 4) were tracked. One third of the sample moved toward retirement with 28% progressing to partial retirement by wave four, while 5.5% transitioned from not being retired at all to full retirement. However, this was countered by those who reported being completely retired at baseline and moving back into farm work. Of the 146 who reported being completely retired at Wave one an astonishing 43.8% had moved back into farm work. The findings were more inconsistent among those who reported being partially retired at baseline. For these participants, there was an initial surge toward re-entry into farm work at Wave 3, then a moderate regression back to retired status by Wave four, although just 62.4% defined themselves as completely retired at Wave four. These movements may be reflective of seasonal work done by the respondents, who might consider “retirement” as seasonal, or it might reflect the underlying sociocultural aspects of farming that were discovered during the focus group discussions. From those data the attachment to the land and the meaning of farm work was illustrated by statements such as: “I don’t know what I would do if I didn’t farm, it’s all we know,” and “If I didn’t do farm work, I might end up as one of those statistics (meaning farm suicide) we talked about.” Having tried retirement from farming, the respondents may have re-entered farm work as a time filler or “therapy” as one respondent explained it.

Figure 79. Movements across time from/to retirement

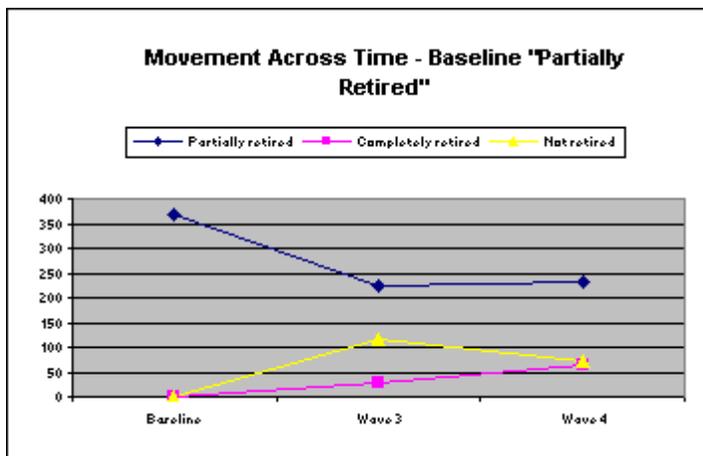
**Not Retired at Baseline**

	<u>Baseline</u>	Wave 3	Wave 4
Not retired	292	222	194
Partially retired	0	65	82
Completely retired	0	5	16



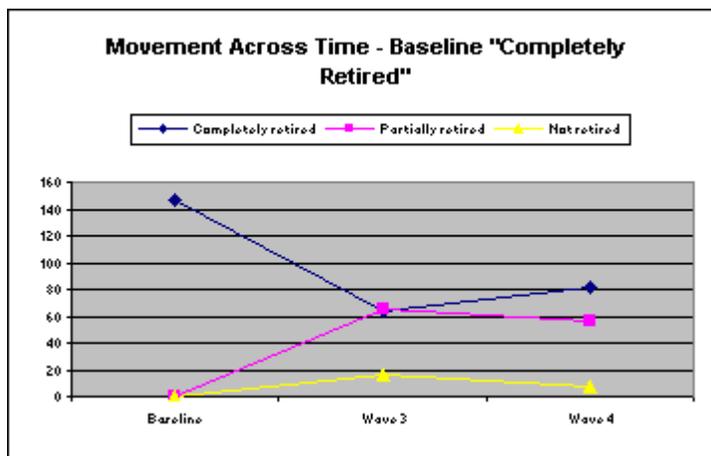
**Partially Retired at Baseline**

	<u>Baseline</u>	Wave 3	Wave 4
Partially retired	370	225	231
Completely retired	0	29	66
Not retired	0	116	73



**Completely Retired at Baseline**

	<u>Baseline</u>	Wave 3	Wave 4
Completely retired	146	64	82
Partially retired	0	65	57
Not retired	0	17	7



## Retirement Identification Scale

In an effort to capture respondents' attitude toward retirement from farm work a 15 item scale was fashioned from various retirement survey questions. Respondents were asked to complete the instrument developed to estimate each participant's degree of identification with the idea of retirement as a life progression (Retirement Identification Scale). This instrument was asked at Wave 2 and Wave 4 (see Appendix A , Survey wave 2, Q17 and Wave 4, Q 31). Four possible responses ranged from "Strongly disagree" to Strongly agree." Scores were summed, with reverse scoring for 8 of the 15 items. Possible scores ranged from 15-60. Higher scores on this instrument indicate closer identity with the concept of eventual retirement.

### *Retirement Identification (RIS) at Wave 2*

The average RI score was 38.6 (SD = 6.3), with a range of 19-57.

There were baseline differences in RI score among race/gender groups ( $F = 5.5, p = .001$ ), but the one-way model based on age cohorts did not demonstrate a significant difference among the 4 age cohorts on this outcome. The post hoc analysis indicated that for the race/gender model, The group White men had significantly lower RI compared with all the other race/gender groups, while White women had lower RI scores compared with Black women. means for race/gender are shown in Figure 80, while the group means for age cohort (with no evidence to suggest the means for the levels of this class variable are different) are shown in Figure 81.

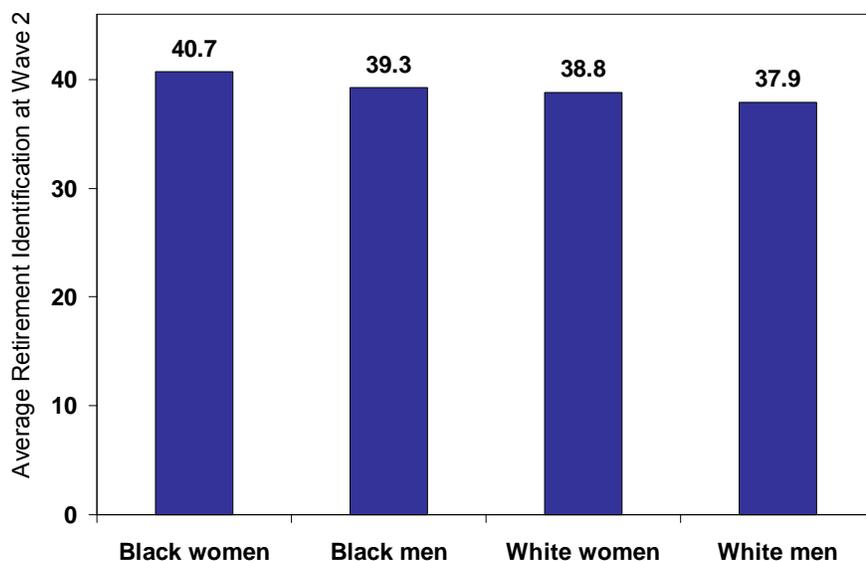


Figure 80. Average Retirement Identification score by race/gender

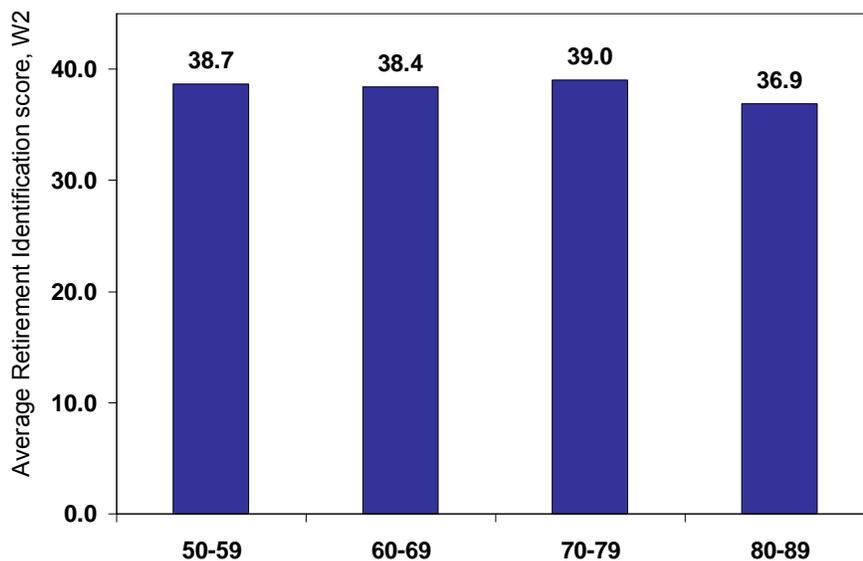


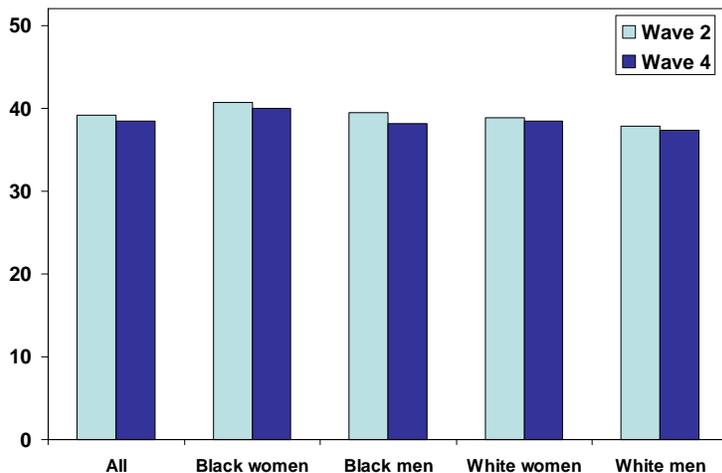
Figure 81. Average Retirement Identification score by age cohort

#### *Changes in Retirement Identity over Time*

The average Retirement Identification score decreased from Wave 2 to Wave 4 ( $F = 7.8, p = .005$ ).

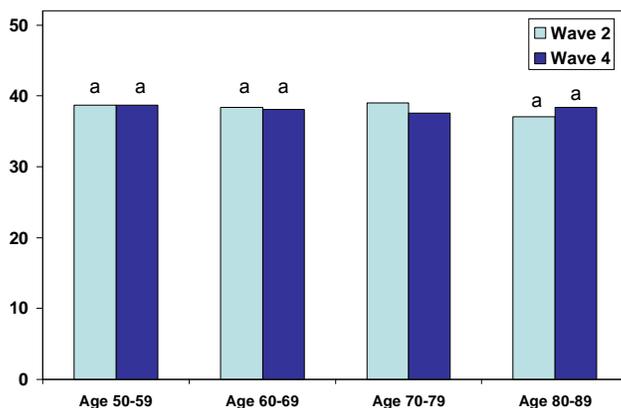
For the comparison of changes over time among the levels of Race/gender, the repeated measures model indicated that the main effect of Time was significant ( $F = 7.4, p = .007$ ) as was the main effect of Age cohort ( $F = 3.5, p = .02$ ). The interaction between Time and Age was not significant. The post hoc analysis of the main effect of time revealed a significant decrease from Wave 2 to Wave 4 for the entire group of subjects, while the main effect of Race/gender was due to increased RI for Black older farmers relative to Whites. Figure 82 shows the mean scores for each combination of Time and Race/gender, but the post hoc analysis of the time by age interaction is not warranted since the interaction effect was not significant in the model.

For the comparison of changes over time among the race/gender groups, the interaction between Time and Race/gender was significant ( $F = 2.9, p = .03$ ; see Figure 31). The post hoc analysis of the Gender/race main effect demonstrated that White participants tended to have lower RI compared with Black older farmers. An additional finding was that the decline from Wave 2 to Wave 4 was significant for the 70-79 years old cohort, but the change was not significant for other age cohorts (see figure 83).



Note: Means with the same letter within each group are not significantly different at alpha=.05.

Figure 82. Average retirement score over time, for the entire sample and by race/gender category.



Note: Means with the same letter within each group are not significantly different at alpha=.05.

Figure 83. Average Retirement Identification score over time, by age cohort

***Specific Aim # 3 Identify the social, health, behavioral, and work environment factors that contribute to the task-specific sustained work of older farmers.***

***Specific Aim #4 Explore the sociocultural, family, and economic factors that influence the work practices and health of older farmers.***

These aims were examined both quantitatively and through qualitative focus groups. The results of each type of data are presented in the following section.

Three rounds of focus groups were held during the course of this study. The discussions focused on four specific topics. The first wave (2003) focused on health, work, use of technology and other strategies to

continue farming. The next wave (2004) targeted mental health, the meaning of work, farm and community relationships, and projections for the future. The final wave of groups (2005) explored perspectives on health and work and persistence and withdrawal from farming.

Focus group data supported that technology and production modifications were used by the farmers to remain in physical production process while decreasing time demands. Participants planned to work until health forced them from the fields. When discussing retirement, more attention was placed on the future of the farm than on health or desire to retire. Work was portrayed as stress relief, something to be enjoyed, a measure of health status, and a major component of self-identity. Themes which emerged from these discussions are presented in the paragraphs that follow.

### **Adaptations to Make Farm Work Easier**

A list of nine adaptations to make farming easier were asked in four survey waves (Table 62). The results illustrate that older farmers do make adaptations in order to continue farming. Most notably they update their equipment, reduce the scale of operations, change from crops to livestock (although in this sample that change may be more reflective of the government policy change on price supports for tobacco), and having someone else take over some of the farm tasks. Older farmers also reported purchasing computers for farm work, illustrating that they are willing to learn and use new technologies.

Table 62. Adaptations to make farming easier expressed as percentage of total sample in that wave

<b>Adaptation</b>	<b>Wave 1 In the past 5 years</b>	<b>Wave 3 in the past 12 months Q.11</b>	<b>Wave 4 past 12 months Q22</b>	<b>Wave 5 past 12 months</b>	<b>Average wave 3,4,5</b>
Bought newer equipment	53.8	33	31	28.5	30.8
Purchased a computer for farm use	17.7	11	10	8	9.7
Changed from livestock to crops	6.1	5	5	4.5	4.8
Changed from crops to livestock	15.7	10	16	14.3	13.4
Leased out or sold	20.4	17	18	16.7	17.2
Stopped raising certain commodity	24.7	17	23	25.5	21.8
Had someone else take over task	21.8	22	21	20.1	21.0
Reduced scale of operations	32.7	26	30	26.4	27.5
Some other change	32	95	94	5.5	64.3

*Use of technology and other strategies to continue farming*

Focus group participants identified several strategies that enable older farmers to continue farming. They further stated that farmers will use any or all of them in an effort to remain engaged in their farm operations. These strategies are: reducing the amount of operational land through leasing, sale, or participation in federal set-aside programs; changing the commodities raised and the methods of production by moving from labor-intensive to capital-intensive to low-labor commodities; utilizing machinery; hiring help to reduce their own labor inputs; and ultimately, shifting to management only. For example, a farmer may stop raising tobacco or milking and move to raising beef cattle. Next, s/he may then move from square hay bales to round bales and then hire a worker to assist with cattle management. Finally, the farmer may turn all labor over to the hired hand and become a “pick-up farmer” – someone who monitors farm activities and makes operational decisions from their pick-up truck. “I still do row crops but I do no-till because it requires less labor” or “I am still operating the farm raising hay and cattle. I did give up dairying and I do rent [out] some land”. “I guess I’m the “go-fer” now. I mostly do the tractor work – bush hog, sow grass seed when we need, cut hay and haul feed. I haul a lot of feed from town.”

The next strategies involve first retiring from “public work” so that their labor can be devoted to farming only. “It used to be that I had a public job and farmed, but then I retired from the public job and now I just farm.” The next strategy involves shifting a greater share of the physical labor to an adult child. This adjustment in work is generally referred to as “cutting back,” a term the semi-retired farmer uses as the transition to retirement occurs. Of course, this strategy is only viable if there is a next generation member who wants to farm.

Each of these strategies enables an older farm operator to adjust the scale and/or nature of the farm enterprise to the realities of their physical situation. Sometimes the changes are planned in advance. But more often, the adjustment occurs as a consequence of another set of events that lead the farm operator to reassess their business situation. For example, one participant commented: [“I stopped row cropping because of] modern farming with all the chemical and pesticides and the modern equipment. The equipment you have to have to use the new chemicals, I just didn’t have. When my combine caught fire, I said ‘Well, that’s it.’ It just wasn’t worth it to buy a new combine given my age and the size of my farm.” [e.g. farmer stopped combine operation]. Whatever the reason, older farm operators seek and adopt strategies that enable them to remain active in the business of farming.

Technology has dominated farming over the past years. In some cases, technology has allowed the farmer to continue to farm as s/he has aged. Fewer farm workers are needed due to use of technology. Farmers have relied on this technology as they have gotten older.

The findings were mirrored in the analysis of the baseline survey data as reflected in Table 63 below. While most changes are consistent across ages, it is notable that as aging occurs, older farmers are less likely to invest in new equipment and more likely to lease out the land, scale back operations, and rely on others to help. However, even among the oldest age group, only one third reported that it was very likely that they would stop farming completely in the next five years. The importance of farm work is underscored by these findings.

Table 63: Adaptations to continue farming by age group (baseline results)

<b>Adaptations to continue farming</b>	<b>Under 65 N=749</b>	<b>65 - 69 N=267</b>	<b>70+ N=407</b>	<b>Total Sample N=1,423</b>
<b>In the past 5 years, have you done any of the following to make your farm work easier?</b>				
Bought newer equipment to make a farm task easier to do	59.8	50.6	45.0	<b>53.8</b>
Reduced the scale of my operation	31.9	33.0	34.2	<b>32.7</b>
Stopped raising or producing a particular crop or animal	25.5	20.0	26.3	<b>24.7</b>
Had someone else take over a farm task	17.1	23.6	29.2	<b>21.8</b>
Leased out or sold land	19.0	16.4	25.8	<b>20.4</b>
Purchased a computer for farm use	24.6	14.2	7.4	<b>17.7</b>
Changed from primarily crop production to livestock production	15.4	15.7	16.2	<b>15.7</b>
Changed from primarily livestock production to crop production	5.9	5.6	6.9	<b>6.1</b>
<b>Do you have someone you rely on for assistance with your farm work if you need it for any of the following situations?</b>				
In an emergency	75.5	71.6	78.0	<b>75.5</b>
On a regular basis	45.4	48.5	52.6	<b>48.0</b>
Because of health problems	56.5	59.6	66.4	<b>59.9</b>
<b>Thinking ahead to the next five years, how likely is it that you will make any of the following changes on your farm?</b>				
<b>Stop farming completely</b>				
Very likely	19.5	29.7	36.3	<b>26.2</b>
Somewhat likely	27.6	31.3	28.0	<b>28.4</b>
Not likely at all	52.9	39.0	35.8	<b>45.4</b>
<b>Change your type of farming (for example: crops instead of livestock)</b>				
Very likely	12.0	12.3	12.7	<b>12.3</b>
Somewhat likely	21.6	18.7	12.4	<b>18.5</b>
Not likely at all	66.4	69.1	74.8	<b>69.3</b>
<b>Transfer farm management to another persons</b>				
Very likely	11.4	19.1	20.2	<b>15.3</b>
Somewhat likely	19.2	22.2	23.4	<b>20.9</b>
Not likely at all	69.4	58.7	56.5	<b>63.8</b>
<b>Lease farm to someone else</b>				
Very likely	9.1	12.7	21.0	<b>13.1</b>
Somewhat likely	17.1	21.3	16.7	<b>17.8</b>
Not likely at all	73.8	66.0	62.3	<b>69.1</b>
<b>Have someone else take over farm tasks</b>				
Very likely	14.7	23.5	26.4	<b>19.6</b>
Somewhat likely	24.4	27.9	29.1	<b>26.4</b>
Not likely at all	60.9	48.6	44.5	<b>54.0</b>

## Perspectives on Health and Work

*“When its winter and the wind is blowing and the snow is on the ground and its freezing out there and you have to go back a half mile or so to feed the cattle, and you think to yourself, what if the tractor breaks down? And you ask yourself, could you get back to the house? When you start thinking like this, you know that in your heart you feel that your health is slipping.”*

A significant number of the focus group participants reported health problems that limit their physical mobility and their ability to work (e.g., coronary disease, severe arthritis, loss of a limb). They admitted to working at their “own pace now” and “having difficulty getting into the combine” and not being able to “work 23 hours a day anymore.” Most were willing to concede that the hard physical labor of decades of farm work - combined with their age - have contributed to their physical and health problems. But, almost uniformly, both husbands and wives agreed that “farming keeps you healthy.” One farmer explained it this way: “Sometimes I look at our situation (our health) and I wonder if it’s not because of all the farm work. But then I look at others who didn’t farm and they’re worse off. So I believe that farming has kept us better off than we would have been. Truth is, I don’t regret any of it.” This belief that the physical requirements of farming have contributed to their good health was a motivating factor in the persistence of farm work among this cohort. These findings were confirmed by the survey results across all waves of data collection. Forty percent of the sample defined health as the ability to work.

About half of the participants had also worked public jobs (e.g., banking, factory security or production line, sales, teaching). In popular terms we call these “part-time” farmers, but in reality, these farmers work two jobs – public work during the day and farming at night and on weekends. One couple offered the following look at this: [Wife] He would drive three hours to work on the farm on his day off so that he could do his farm work. [Husband] Yeah, someone at work would say did you have a hard day? And I would say, ‘nah, I just cut tobacco.’” Obviously, this kind of schedule leaves little time for rest or relaxation and most people would find juggling two jobs to be very stressful. So, why do they do it? These two comments found lots of agreement: “Farm work reduces your stress and it relaxes you from the pressures of your public job” and, “Farm work was different from the kind of work you did in your public job.” In a sense, farm work was a type of therapy for the farmer. This was confirmed through the survey data. The majority of the sample held an off-farm job, averaging 32 hours per week of off farm work. When queried as to why they worked off-farm the main reason was for income, particularly to have the financial support to continue farming.

The commitment and passion for the vocation of farming is not muted by illness or injury. All of the wives agreed that there had been times when they felt their husbands were too sick to farm. Sometimes they would protest and urge their husbands to stay home, but to no avail. “Yes there were times when I thought he was too sick to farm. But even if I said he had no business going out there to farm he would just say he was going out for a while. He would do this when he had the appendicitis, the implant and the pneumonia.” The husbands were also willing to admit that there were times they probably should not have been working. But they also believed “If I was so sick that I could not work, it would mean selling the cattle and this would be a big deal for me.” Moreover, on a family farm it is not easy to take a sick day because the cows have to be milked, the tobacco has to be set, or the crop has to be harvested. “When I had the appendicitis surgery and the doctor told me to lift nothing heavier than 5 pounds, I went to the barn and up to the loft to get hay for the dairy cattle. I would cut the bale and push the flakes off and shove them over the edge.” It is important to note how this farmer adapted to his situation. He was told not to lift anything heavier than 5 pounds and hay bales average 45-70 pounds. The cows had to be fed. So he cut his bales and shoved with his feet. Of course this begs the question of whether he should have climbed up the ladder to the hay loft but as he pointed out, the doctor had not told him he couldn’t!

To a great extent, for these focus group participants, if you can still get out on the farm and contribute in some way to the work that needs to be done, you are healthy enough. Injuries and illnesses that would lead many in other occupations to stay home for a day or go to see a doctor are not of sufficient consequence for many farm operators to decide not to farm. In the survey data the leading reason for no longer performing physical farm work was health problems (45% of the respondents), conversely 12% felt doing the work kept them physically healthy and another 5% indicated that doing farm work helped their mental status.

### **Persistence and Withdrawal From Farming**

Initially, when asked to describe their work on the farm, many of the focus group participants protested that they weren't really farming anymore. But, as the discussions continued, it became clear that all were still active on the farm but no longer doing all the farm work they did when they were younger. While there have been changes in their physical work relationship to the farm, they are still active in all aspects of decision-making as well as some of the labor. For these participants, being able "to get out in my truck to check out the farm" and to make the decisions that determine the future of the farm were essential for their self-identity, because farming anchors their lives.

At an age long after most other Americans are comfortably settled into retirement, these farmers continue to farm -- to get up early and go out and work with the land to make a living. Even when both they and their spouse know that because of their health they should not go out, they still do. Why they persist in an occupation that demands so much both physically and mentally is reflected in the following responses:

"You have got to have the love for it, for farming. If you don't, it would be hard for you to understand why we stay."

"A friend of my daddy's said it best and I say it all the time too. 'You feel closest to God out in that field.'"

"It's in the blood. We always liked it. It's part of who we are."

These comments are reflective of the personal satisfaction they derive from doing farm work. In the survey results, liking the work was the number one reason given for continuing farm work (43%), more than twice the prevalence of the second leading reason "need the income" named by only 20% of the sample.

When asked to think about a time when they won't be farming and what they would be doing, three types of responses emerged. The most typical was a humorous rejection of the possibility:

"I'll be covered with dirt!"

"Well, they will have to hit me in the face with a shovel before I don't get out there on the farm!" (Husband) "I'll be cremated and spread on the lawn." (Wife) "No, I don't want to grow tomatoes on him!"

"I got one more move left in me and that is from the house to where they bury me."

"If I couldn't farm, I might become one of those statistics we were talking about (in reference to suicide rates of farmers)."

### **The Meaning of Work**

Capturing the meaning of phenomena is usually a difficult assignment. In the case of determining the meaning of work for these older farmers, it was remarkably clear. First, work gave meaning to life itself. "Doing things on the farm is a reason to get out of bed," remarked one participant. This sentiment was

echoed by others in the group. Farmers' self-identity is tied to their farm work. "A farmer, he don't know how not to work" and "Farming is a habit, a way of life. We don't know anything else to do," were comments that captured the essence of work for the participants. On the other hand, the definition of work itself was clouded. "Mowing isn't really work" and "There are differences in kinds of work. If you are doing it because you want to, then its not work," were comments that helped clarify that even though some participants stated they were retired from farming, what this really meant was that the physical labor was no longer required for them financially, it was now a choice.

### **Attachment to the Land**

Underscoring the true meaning of work was the participants' attachment to the land itself. This was most graphically portrayed by the following statement. "I am never going to leave the farm. Never." No one in the group objected and several heads nodded in agreement. These farmers recognized the obstacles they faced in their fight to retain the land. "Many of the farms in our area are just growing up, and the buildings are starting to fall down. They've been abandoned. No one in the families want the farm, but no one wants to sell them," and "I asked my 4 daughters what they wanted me to do with the farm and they said they didn't care what I did." There was a gasp from 2 of the farm wives in the room so I asked them why. The response was "I just can't believe someone would feel that way about the land. I just can't imagine ever saying that about the farm." The participants realized they might be the last of the full time farmers. This was particularly true of the African-American farmers. "A lot of part-time farmers will take over the farms in this area. It's a good place to live; you can get some supplemental income, but not a major portion of your income." The realization is there that times have changed. As one participant stated, "In our lifetime we've seen more change in farming than probably anybody else who has ever lived before. And the next 5 to 10 years is going to change it even more." Despite this, the land is precious and the hope of passing the land to a family member for farming is evident in the survey data.

The leading qualitative responses about attitudes toward farm work and life were "farm preservation in the family", tied with "preventing farm land development". Two out of three respondents reported that keeping the farm in the family was very important. This persisted in the three survey waves where the item was included. Ninety-three percent of the sample owned their farms. On average, the farms had been in the family for about three generations, thus it was not surprising that 78% of the participants had done farm work before age 18. Yet, of those that had children, 57% reported that their children were not interested in taking over the family farm. Of those who felt their children would take over the farm, 89% reported that they felt the child had a very good chance of being successful. While the participants were hopeful about generational transfer, only 19% had set up a trust or made other tangible efforts to insure the transfer.

While acknowledging that there might come a time when they would no longer be able to operate the farm, the general feeling was: "I don't plan for this time, it will just happen." But even if they can't farm, most said they would not leave the farm (i.e., move into town). As one wife asserted and many agreed, "The truth is, we wouldn't be happy anywhere but here." Moving to town would sever the ties to the land and way of life that has shaped their entire lives. Only a very few felt a need to plan for this time, but the planning was in the context of assuring that the farm and the assets it represents would be protected and made available to a family member or even someone else who would care for the land. In other words, these older farm couples had great difficulty in imagining a time when they would not be on the farm or what they would do on a daily basis if they weren't on the farm. In the survey data, four of ten noted that it was very important for them to do farm work (unrelated to income), reflective of the 60% who reported they gained a great deal of personal satisfaction from doing farm work.

## Farm and Community Relationships

Several participants noted that they had changed their enterprise because of the growing dominance of “corporate” farms or because they felt uncomfortable with the “modern equipment and the chemicals.” Historically, farming has been a communal activity with neighbors sharing equipment and labor and the nearby community providing supporting goods and services to the farm families. Access to seasonal labor, farm supplies and machinery, and farm services is critical for the survival of the farm and so there is this interdependence between farm and community. Small family farms are being converted into larger farms and corporate farms. What used to be an agricultural community that was tight knit and family oriented has evolved into an individualistic community. Thus, changes in nearby communities and the larger society influences the context in which family farming occurs.

One of the most important changes discussed was rural residential growth, which is a double-edged sword. Rural residential growth can be very profitable for a farmer if they want to sell – “Well, the truth is, where the money is in farming is in selling off lots.” But if you don’t want to sell and your farm neighbors do, rural residential growth can be problematic. “Lots of people are moving in but they aren’t farmers and they’re not neighborly. There is some strain with the newcomers about property lines and cattle wandering.” For many newcomers, the ideal of rural life often collides with the reality of the kinds of work that happens at all hours on the adjacent farm. In a series of questions about attitudes toward farm work and life (Wave 2) 65% of the participants reported that it was very important to them to keep the farm in the family and to keep their land from being developed. However, only 19% strongly agreed that in order to prevent development farmers should sell their development rights to a public or private trust.

A second change in the community identified by the focus group participants involved access to labor. As the economies of rural communities diversify with manufacturing and better roads open access to more distant employment opportunities, the available pool of farm labor shrinks. When a farmer can’t hire seasonal labor because it is not available or the farmer can’t offer competitive wages to those in a public job, the farmer has to adjust. Among these older farmers, their strategies included doing more work themselves, changing their commodities (e.g., quit tobacco farming and raise cattle), buying different equipment (e.g., raise round hay bales which can be managed exclusively with mechanical equipment), or reducing the scale of their operation. These adaptation strategies were highlighted in Table XX of this report.

A third change is in the nature of community life. Many commented that they were no longer surrounded by others who farm and the old patterns of “neighboring” -- visiting and providing assistance -- were disappearing. As one participant commented, “You hardly know your neighbor anymore.” The increase in traffic on rural roads and the greater likelihood of accidents between cars and farm machinery or trucks was also reported as a change in the farming community. Two of the participants had personally been injured in farm vehicle accidents on rural roads and many knew of other farmers who had experienced this type of injury.

When asked to think about what these changes meant for what would happen to their farms, participants expressed both hopes and fears. Some observed that they were one of the last still farming in their area as surrounding farms were being sold for subdivisions or “mini-farms.” Others reported their adult children were gradually assuming more and more interest in the family’s homestead. Still others felt that even if no one in the family wanted to farm, the farmstead itself would remain because it was the family’s gathering place and the grandchildren loved to “come to the farm.” African-American farmers were particularly apprehensive about the future of their farms. “We might be the last [to farm]” was a frequently echoed statement. In the context of the nation’s farm population they may be correct as the number of African-American farmers is demonstrating a steady decline. So, the current generation is staying in place as long as possible. Over half of the participants reported in the surveys that none of their children were interested

in taking over the farm enterprise when the older farmer stopped farming, yet 49% of them reported that it is very important to them to maintain the family tradition of farming and 65% stated it was very important to keep the farm in the family.

But a few couldn't really answer the question because their future was uncertain. One couple explained that they had rented the farm they now own for several years before buying. Then, in the 1980s they went bankrupt. They managed to keep the farm but have been trying to recover financially since then. It is a struggle given declining farm prices, rising operating costs, and declining health. Their last comment tells the story of many older farm couples: "When you sit in the house and see the farm falling apart -- everything you worked for all your life. It hurts. It really hurts."

What happens in rural communities and the larger society is consequential for family farms. Sometimes the changes force adjustments in how the business is operated and sometimes they open new opportunities. There was a sense that these broader social and economic changes were forcing a transition from a farming way of life to something different. But these older farm couples are determined to hold on to their farms and their farm work for as long as they can because this is what gives meaning to who they are. As one participant said, "I was born within 50 yards of where I live right now. That what the farm means to me."

### **Off-farm Work**

At baseline, 42.7% of the farmers reported having off-farm job. The percentage of farmers employed off the farm decreased with age (from 69.9% age 50-59 to 10.8% above age 80,  $p < .0001$ ), but there were no significant differences in the percentage with an off-farm job by race (Black: 45.8%, White: 42.2%;  $p = .2$ ) or gender (Male: 40.2%, Female: 45.6%;  $p = 0.06$ ). Table 64 displays off-farm work status of the sample by gender, race, and age groupings.

At baseline, the participants reported spending an average of 13.5 hours per week ( $SD = 16.4$ , range 0-98) on farm work and 25.6 ( $SD = 19.1$  range 0-100) at an off-farm job. The correlation between the hours spent on farm work and at an off farm job was not significant ( $r = -0.04$ ,  $p = .3$ ).

Table 64. Off-farm work hours by wave, age, and gender

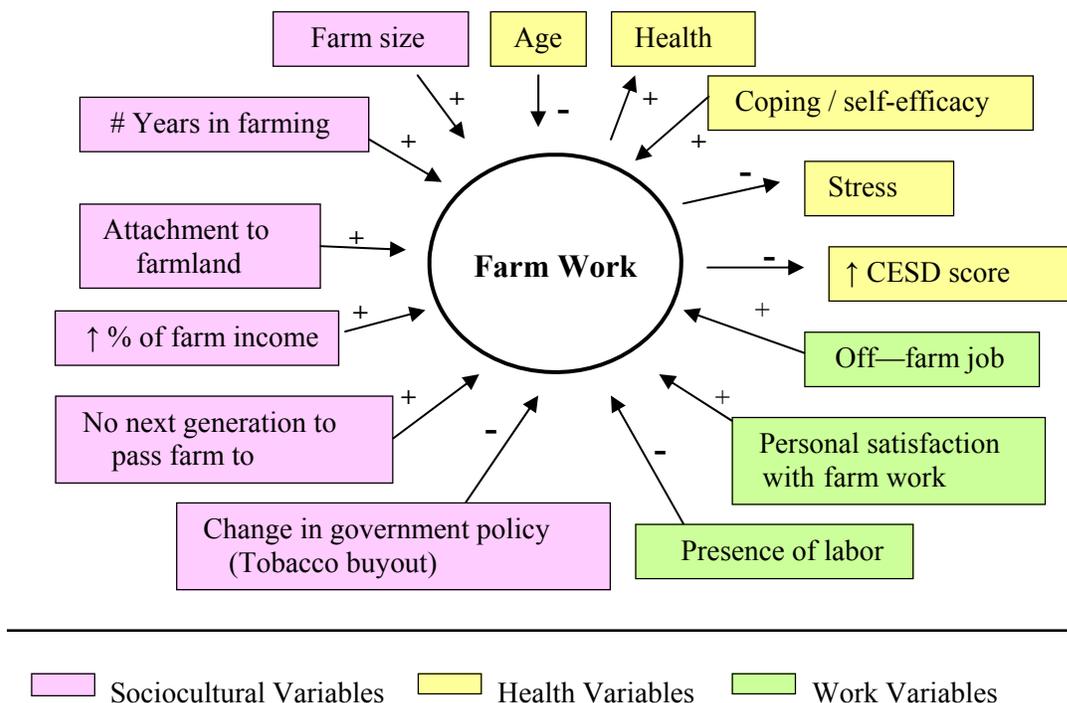
Age	Category	Wave 1				Wave 3				Wave 4			
		N	Mean	Standard deviation	Range	N	Mean	Standard deviation	Range	N	Mean	Standard deviation	Range
All	All	697	25.6	19.1	(0-100)	332	31.9	13.7	(0-96)	310	29.9	15	(0-80)
	BM	87	23.9	18.2	(0-60)	47	33.2	16.3	(1-96)	37	32.5	18	(1-80)
	BW	62	30.3	20.6	(0-100)	25	28.7	13	(6-40)	20	28.2	13.5	(3-50)
	WM	269	26.2	20.2	(0-99)	118	32.8	14.4	(1-84)	117	29	16	(0-65)
	WW	266	24.9	17.8	(0-70)	137	31.7	11.9	(0-52)	133	29.6	12.7	(1-60)
50-59	All	281	34.1	16.1	(0-100)	167	35.4	10.8	(0-60)	149	34.8	12.1	(0-65)
	BM	36	32.2	14.5	(0-50)	24	37.5	9.1	(20-60)	19	35.4	12.5	(6-60)
	BW	27	37.6	17.1	(0-100)	13	32.8	10.9	(8-40)	12	29.3	14	(3-40)
	WM	95	37.9	16	(0-99)	57	36.4	11.5	(5-60)	53	37.1	12.2	(0-65)
	WW	118	31.3	15.6	(0-70)	70	34.8	10.2	(2-52)	63	33.6	11.5	(5-60)
60-69	All	256	24.2	18.8	(0-99)	121	28.7	14.4	(1-84)	117	24.5	14.6	(0-80)
	BM	27	27.3	17.7	(0-60)	15	27.3	14.2	(2-40)	12	28.3	21.5	(1-80)
	BW	20	26.1	23.3	(0-99)	9	19.6	13	(6-40)	7	26.1	14.4	(12-50)
	WM	104	26.1	19.2	(0-74)	45	30.9	16.6	(1-84)	46	20.7	15.2	(0-60)
	WW	101	21.4	17.7	(0-50)	51	29.2	12.1	(1-50)	52	26.8	11.6	(1-50)
70-79	All	114	10.2	15.1	(0-55)	30	23.9	19.1	(0-96)	34	22.2	18	(2-80)
	BM	15	3.7	8.4	(0-30)	5	33.4	37	(1-96)	3	11.3	11.4	(2-24)
	BW	7	14.9	19.7	(0-45)	0			(-.)	1	30		(30-30)
	WM	62	11.1	16	(0-55)	16	25	14	(5-48)	18	26.1	16.7	(2-60)
	WW	29	10.9	14.7	(0-50)	8	16.3	13.4	(0-40)	11	13	8.5	(2-32)
80-89	All	19	5.1	10.8	(0-40)	2	9	9.9	(2-16)	1	74		(74-74)
	BM	6	8.7	10.3	(0-24)	1	2		(2-2)	1	74		(74-74)
	BW	0			(-.)	0			(-.)	0			(-.)
	WM	7	5.7	15.1	(0-40)	0			(-.)	0			(-.)
	WW	4	0	0	(0-0)	1	16		(16-16)	0			(-.)

**Rudimentary Model of Factors That Influence Sustained Farm Work**

One purpose of the study was to develop a model of factors that contribute to the sustained work of older farmers. Initially, this model was planned as an outcome of structural equation modeling. Unfortunately, the project was plagued with an enormous amount of turnover of key personnel and we were unable to complete all proposed analyses. We will continue to conduct analyses, but at the present we do not have the full model in place. However, we do have a rudimentary model based on preliminary quantitative analyses and on findings from the focus groups. This model is presented below (Figure 84). It is supportive of the existing literature.

**Figure 84. Model of Sustained Farm Work based on Qualitative Findings \***

*\* Currently being tested quantitatively*



**Selected Findings from Wave Five**

**Policy Implications**

The purpose of this final survey wave was to discover older farmers’ perceptions of the effect of the tobacco buyout on their farming and their future. This cohort has the strongest historical ties to tobacco and may be at a disadvantage compared to younger farmers in terms of changing commodity bases and making other adjustments to continue agricultural production. All previous survey participants who reported growing tobacco in 2002 were eligible for the survey. For this wave only one survey per household was solicited. The invitation letter asked that the person most involved in agriculture in the household complete the survey. This produced a pool of 842 potential participants.

Government tobacco production quotas and price supports have been in effect in the U.S. since the 1930s. In recent years, improved quality of inexpensive imported tobacco, increasing cost of cigarettes, and tobacco product enhancements that use less and lower quality tobacco have all contributed to a steady decline in demand for the U.S.-farmed tobacco leaf (Serletis, 2004; Tiller, 2003). This decline forced significant reductions in quota levels; between 1997 and 2004, quotas fell by over 56% (Capehart, 2003). Decreased tobacco production, coupled with fixed high prices set by the government tobacco support program, created a disconnect in the system that severely limited income from tobacco and impaired the ability of U.S. tobacco growers to compete in the world market. Partially in response to this growing crisis, Congress passed the Fair and Equitable Tobacco Reform Act of 2004 (FETRA, also commonly known as the tobacco buyout), which eliminated the government tobacco quota and price support system. To help farmers transition from a government-controlled production system to a competitive market, the act called for approximately \$9.6 billion in compensatory payments to quota owners and tobacco growers between 2005 and 2014.

The tobacco buyout is expected to permanently change the structure of tobacco farming in the United States. Nearly all (94%) of U.S. tobacco produced is grown in six Southern States (Capehart, 2004). In 2002, about 30,000 Kentucky farmers produced tobacco; in 2005 that number was estimated at below 10,000 (Snell, 2005). In a survey of planting intentions for 2005, the National Agriculture Statistics Service reported a 30% decrease in the number of farmers who intended to grow tobacco (Snell, 2005). Growing tobacco has become a risky financial venture. As a result of the buyout, small-scale operations will likely not be able to compete and/or handle the new environment and will exit the market, resulting in a major life change for the farmer who must choose to shift to a new commodity or exit farming entirely. Some of these farmers, however, live in areas where alternative sources of income are not readily available, and may need to continue to grow the crop despite the financial risk (Brown, 2004). Most tobacco farms are small with limited possibilities for expansion (Capehart, 2004). Family farming hinges on a symbiotic relationship between family and work (often including on-farm and off-farm jobs). The ability of the farmer to remain in the fields depends on a combination of physical, mental, and social characteristics. When policy changes such as the tobacco buyout are thrust upon farmers, the result is an upset in the delicate balance of economy, seasonal rhythm, labor division, and even cultural practices (Neville & Miller, 2000). The end of price supports for agricultural commodities creates an upheaval among growers that often culminates in exodus from the farm. For example, when the price support system for the dairy industry was phased out between 1985 and 1986, the number of dairy farms in the nation fell from 282,430 in 1984, to 227,880 in 1987. This decline continues even today, with only 81,440 dairy operations remaining in the United States in 2004 (USDA, 2005). Peanut farmers experienced a similar restructure in 2002 when their quotas and price supports were eliminated (Capehart, 2003). The fate of tobacco farms remains to be seen.

### *Method*

A cold mailed method was used. Since the sample had participated at least once in the primary study they were familiar with the survey layout and the investigator. The 61 item survey (See Appendix A, Wave 5 survey) was accompanied by a cover letter explaining the purpose of the study. Persons who completed the survey were compensated \$40 for their participation. No further attempts were made to contact the sample unless clarification was needed on certain items. Unlike the previous survey waves only one survey per household was mailed. The cover letter asked that the person in the household who was most involved in farm decisions complete the survey.

Data were coded by the research team and entered into a SAS program by a single enterer who double checked all entries. Of the 606 usable surveys (missing less than ½ of data, no obvious social response biases, and answers within acceptable range), 485 participants noted they qualified for the tobacco buyout. The remainder of the analysis is based on these 485.

## *Results*

The sample was primarily male (77%), Caucasian (89%), and married (83%). Although both Kentucky and South Carolina was included, only 10 participants from South Carolina were eligible for the buyout. Participants reported a 12<sup>th</sup> grade level of education. Farm ownership and key decision making was noted by nearly all the sample (94.4%). An additional 4.9% indicated they had sold the farm. In most of these cases ownership passed to an adult child. Roughly half of the respondents reported a gross total household income of less than \$40,000, and half of those were less than \$25,000. It is noteworthy to point out that most farmers reported only a minor portion of their income coming from farming. Only 15% noted that farming made up at least half of their total income. It is acknowledged that findings from this sample may not accurately portray the effects of the policy change on farmers who rely more heavily on tobacco as a major commodity or for a major portion of their income.

Farm acreage ranged from 2 acres to 3,200 acres with a median of 117 acres. In the past year, farms generally produced several commodities with hay and cattle and calves most common. Overall, farms reported a mean of 2.6 commodities (SD 1.3). Tobacco was grown in the past year on only a quarter of the farms. More farms reported crops than livestock production. The “other” category included grains (9), pasture (4), timber (4), and bees and honey (2). Only 7 farms reported no production and some of these indicated income from government “set aside” programs, in which the farmer is paid not to grow a crop in order to let the land rest.

The sample demonstrated a long history with farming and with tobacco. Farms had been in the family for over two generations and most participants planned to pass the farm to their children. Half of the sample reported receiving income from tobacco for at least 38 years, yet there were clear indications that the dependence on the crop had decreased. The decline in production was underscored by the trend noted. While 485 produced tobacco in 2002, only 61 reported growing the crop in 2005. In addition, 38 participants reported they planned to not grow tobacco in 2006.

Over half (68%) of the respondents reported that the buyout would have no effect on their plans for the future. Some positive aspects of the income were noted. Nineteen percent reported it would improve their retirement options, and 16% stated it would allow them to scale back farm production. Only 3.4% felt the new policy would force them to work more on the farm. Equivocal results were noted for how the buyout would affect their overall financial situation. Forty percent felt it would improve their situation, 15% feared it would place them at a financial disadvantage, and 45% indicated they felt it would not affect their finances at all.

Respondents in this study generally elected to receive their buyout payments over the ten year period; only 17% chose the lump sum discounted payment. One question listed four options for use of the payment: apply it to debts, use it to change farm operations, put it toward retirement, or some other use. Respondents were allowed to check as many options as applied and to list specific reasons under the “other” category. Multiple uses were planned for the income. Table 65 illustrates the leading uses for the payments.

Table 65. FETRA payment applications

Rank	Use	Frequency	Percent of total sample (n = 485)
1.	Apply to debts	168	34.0
2.	Retirement	211	43.0
3.	Pay living expenses	22	4.0
4.	Invest/save it	19	3.0
5.	Pay taxes/insurance	11	2.0
6.	Other	15	3.0
Total	-----	446	-----

Some of the respondents (12.6%) reported that the buyout had affected their health. The direction of the effect was not asked. Sixteen percent felt their level of worry had decreased because of the buyout, 6.5% reported worry had increased, and 77.5% felt the worry level was unchanged. The average CES-D score for the sample was 7.8. In a comparison of CES-D scores, there was no difference by whether or not the respondent qualified for the buyout.

Findings from this analysis spurred the submission of an R21 proposal to delve more deeply into the effects of the effects of FETRA. It is of particular importance that farmers who have a more vested interest in tobacco be studied across this time of commodity change and potential loss of income. The proposal is in review at this time.

### **Preventive Health Measures – Tetanus Immunization**

Although tetanus could be abolished through proper immunization, it continues to claim lives worldwide. The very young and the elderly are at highest risk for the disease. Adults age 60 and over have twice the incidence of tetanus compared to their younger adult counterparts (CDC, 1998). Persons engaged in production agriculture are at high risk for injury, the leading predisposing factor associated with tetanus. The purpose of this analysis was to examine the factors that contribute to tetanus immunization status of older farmers.

#### *Method*

This analysis is based on data collected between 2002 and 2006 across five waves of surveys. Surveys with excessive missing data (more than one page) were deleted from the sample set. Farmers that completed both a wave 1 and wave 5 survey were included, resulting in an analysis file of 595 cases. In addition, injury data from waves 1 through 5 were included for the injury analysis.

The survey instruments were adapted from the Kentucky Farm Family Health Interview Survey (FHIS) (Browning et al., 1998) and gathered data on farm type, farm work tasks, off-farm employment, and injury. Data on farm demographics and standard socioeconomic factors (age, education, marital status, race and ethnicity, and income) were also collected. The question about tetanus immunization (included in wave 5 only) was taken from the FHIS and asked simply if the respondent had received a tetanus immunization in the last ten years. Respondents who answered “don’t know” were reclassified as unimmunized. Injury data for this analysis included only the prevalence of lacerations that required stitches, burns, and amputations during the study period. A list of farm tasks adapted from the FHIS was used. Respondents checked each task they had performed in the past year. To understand the relationship

between up-to-date tetanus immunization and farmer and farm characteristics, bivariate analyses were conducted and chi-square tests run. P-values less than 0.05 were considered statistically significant.

### *Results*

Of the 595 cases in the analysis file, 407 (68.4%) reported having a tetanus booster within the last 10 years ('takers'); 144 (24.2%) reported no current vaccination ('non-takers') and 44 (7.4%) didn't know their tetanus vaccination status. Those who did not know their vaccination status were reclassified as 'non-takers' resulting in 188 (31.6%) in that category. As shown in Table 66, the majority of these 'non-takers' were male and had at least a high school education. Over half of them reported household incomes of \$40,000 or less. The age range of the non-takers was 49 to 89 years (SD = 8.1) They were slightly older than the average farmer, with 83% being over age 60 and 45% over age 70. The majority of the farmers in the taker and non-taker group had seen a health care provider within the past year (91% of the non-takers; 92% of the takers). The only demographic difference of significance between the two groups was gender. Males were more likely to be up to date on their tetanus booster than females. There was no difference in tetanus booster by health care provider visit status, income, education, age, or race.

Table 67 displays farm characteristics for the sample. Most non-takers lived on farms where livestock was present. Nearly all non-takers lived on crop-producing farms, and the majority were on farms where both crops and livestock were present. There were no differences in tetanus booster status by farm acreage or type. The questionnaire included an extensive list of farm-related chores and asked the farmers to indicate whether they had done these chores in the past year. The 188 non-takers performed an extensive variety of farm tasks as shown in Table 68. There were significant differences in tetanus booster status by task, specifically: performing repair work, driving a tractor in the past year, castrating animals or doing other veterinarian-type work, applying pesticides, herbicides or insecticides, and also doing tasks that required climbing higher than 8 feet. A "yes" response to these chores was associated with having a tetanus booster within the last 10 years.

Injuries, specifically cuts requiring stitches, burns, or amputations, were looked at over the 5-year data collection period. Data from each of the five years was examined and the number of farmers who reported having at least 1 cut, burn, or amputation over this time period was tallied. There was no difference in the percentage reporting these types of injuries by tetanus booster status. However, the takers were more likely to have received these injuries while performing farm-related duties. Of the takers who were injured, 58.3% received their injuries while doing farm work compared to 34.3% of the non-takers. Table 68 displays the cuts, burns and amputations received by the entire sample, as well as by tetanus booster status for the 5-year period. Injuries are reported overall and also by farm-work status. There were no differences in percent of cuts, burns, or amputations reported by tetanus booster status; however, takers were more likely to have farm-related cuts than non-takers.

Table 66. Demographic characteristics by tetanus booster status

	Takers (n=407)		Non-takers (n=188)	
	N	%	N	%
Age (years)				
60 and under	67	16.6	33	17.5
61 to 70	152	37.6	71	37.8
Over 70	185	45.8	84	44.7
Gender*				
Male	331	81.3	134	71.3
Female	76	18.7	54	28.7
Education (years)				
Less than high school	93	23.0	40	21.3
Completed high school or greater	312	77.0	148	78.7
Total household income				
\$40,000 and less	197	51.2	97	56.4
More than \$40,000	188	48.8	75	43.6
Race				
White	335	83.8	150	80.6
African American	65	16.2	36	19.4
Seen health care provider within past year				
No	29	7.4	16	8.9
Yes	362	92.6	163	91.1

\* Chi-square test shows significant differences at  $p < .05$

Table 67. Farm characteristics by tetanus booster status

	Takers (n=407)		Non-takers (n=188)	
	N	%	N	%
Acres				
Less than 60	98	24.8	47	26.3
60 – 106	103	26.0	40	22.3
107 – 199	95	23.9	44	24.6
200 or more	100	25.3	48	26.8
Farm: stock present				
No	121	29.7	51	27.1
Yes	286	70.3	137	72.9
Farm: crops grown				
No	17	4.2	3	1.6
Yes	390	95.8	185	98.4
Farm: crop only – no stock				
No	299	73.5	138	73.4
Yes	108	26.5	50	26.6
Farm: both crop and stock				
No	125	30.7	53	28.2
Yes	282	69.3	135	71.8

Table 68. Farm tasks performed by tetanus booster status

	Takers (n=407)		Non-takers (n=188)	
	N	%	N	%
Administrative				
Pay farm bills, do books, order supplies				
No	32	7.9	14	7.5
Yes	375	92.1	174	92.5
Run farm errands				
No	64	15.7	32	17.0
Yes	343	84.3	156	83.0
Repair work (equipment/structures)*				
No	77	18.9	57	30.3
Yes	330	81.1	131	69.7
Drive a tractor in past year*				
No	57	14.4	45	26.2
Yes	338	85.6	127	73.8
Mow fields				
No	109	26.8	71	37.8
Yes	298	73.2	117	62.2
Bale				
No	223	54.8	109	58.0
Yes	184	45.2	79	42.0
Plant crops				
No	250	61.4	117	62.2
Yes	157	38.6	71	37.8
Hand harvest crop (tobacco, row crops)				
No	330	81.1	150	79.8
Yes	77	18.9	38	20.2
Transport crops or animals				
No	195	47.9	106	56.4
Yes	212	52.1	82	43.6
Feed animals				
No	139	34.2	74	39.4
Yes	268	65.8	114	60.6
Castrate animals, other vet work*				
No	226	55.5	123	65.4
Yes	181	44.5	65	34.6
Herd animals				
No	225	55.3	112	59.6
Yes	182	44.7	76	40.4
Apply pesticides, herbicides, insecticides*				
No	193	47.4	108	57.5
Yes	214	52.6	80	42.5
Climb > 8 feet*				
No	165	40.5	102	54.3
Yes	242	59.5	86	45.7
Received cut, burn or amputation within last 5 years				
No	304	74.7	153	81.4
Yes	103	25.3	35	18.6
Injuries that were farm-related*	60	58.3	12	34.3

\*Chi-square test shows significant differences at  $p < .05$

Table 69. Farmers reporting at least 1 cut, burn, amputation from 2002-2006

	Overall (n=595)		Takers (n=407)		Non-takers (n=188)	
	N	%	N	%	N	%
Cut	99	16.6	78	19.2	21	11.2
Farm-related cut*	54	54.6	46	59.0	8	38.1
Burn	44	7.4	30	7.4	14	7.4
Farm-related burn	21	47.7	17	56.7	4	28.6
Amputation	4	0.7	3	0.7	1	0.5
Farm-related amputation	2	50.0	1	33.3	1	100.0

\* Chi-square test shows significant differences at  $p < .05$

### Future Work

This six year panel study yielded new insights into the sustained work of aging U.S. farmers and into the sociocultural environment that frames farmers' identity. The exceptionally low attrition of the sample illustrated the interest that farmers have in their work and issues surrounding their health. The long term goal of the project was to provide a substantial and evidence-based foundation to create health and safety guidelines for aging farmers that would facilitate safe farm work for this rapidly aging work force. Findings from this study reveal that even farmers of advanced ages do not plan to retire until health forces them from the fields, yet they are willing to make adjustments in their work through capital investments, technology advances, and transfer of tasks. There has been an increased interest in aging farmers' work since this project began. As a result, professional journals have asked for articles to publish. A prime example was the September 2004 issue of the American Association of Occupational Health Nurses Journal (Volume 52, issue #9), guest edited by Dr. Reed, which was dedicated to farmer health.

This data set is extremely rich and as yet, has hardly been tapped. Graduate students have used subsets of the data in class assignments. Undergraduate nursing students have presented and published off of the data, enhancing their professional lives with information that will help them provide more culturally acceptable care to farm families. At least five graduate students are in the process of using subsets for their capstone research in public health, gerontology, and family studies. There are nine manuscripts in draft or revision status that we plan to complete this year.

Work is already underway to plan the next step in safeguarding the health and safety of older farmers. A working group has been established to outline a plan of action for development of guidelines. The Principal Investigator has also established working relationships with the National AgrAbility Project and presented selected findings from this study at the national training meeting for AgrAbility personnel. Both Drs. Reed and Garkovich remain committed to listening to the farmers and basing future work not only on the result of this study and other scientific work, but upon the voice of the people who work the land. Two R21 proposals are currently in review: the first is to better understand the effects of FETRA, with particular emphasis on commodity changes that may place the older farmer at increased risk for injury and the mental health issues that may surround the shift away from growing tobacco. The second R21 addresses the feasibility of using the North American Guidelines for Children's Agricultural Tasks (Lee & Marlenga, 1999) as a springboard for guidelines for farm work of senior farmers. This project is a collaboration between the Canadian Agricultural Safety Association, The National Children's Center for Rural and Agricultural Health and Safety, and the University of Kentucky Colleges of Nursing and Public Health (Gerontology division).

## Publications and Presentations

Selected findings from this study were presented in multiple venues from small local events to international symposiums. Oral presentations and scientific poster discussions were given. As of the date of this report, 18 scientific presentations have been made. There is one publication as of the date of this report, a 2<sup>nd</sup> manuscript is in press, and a third manuscript has been accepted with revisions. A number of other manuscripts are in various stages of writing. A list of publications, manuscripts, and presentations is provided below.

### Publications

- Amshoff, S. & Reed, D.B. (2005). Health, work, and safety of farmers over age 50. *Geriatric Nursing*, 26(5), 304-308.
- Garkovich, L., Reed, D., McCulloch, J., Privette, C., & Fields, B. (2005). Perspectives on the persistence of work among older farmers. *Journal of Rural Sociology*. Manuscript submitted January 2005, accepted with revisions October 2005.
- Reed, D.B., Rayens, M.K., Winter, K., & Zhang, M. (2008). Health care delay of aging farmers. Accepted March 1, 2008 *Journal of Agromedicine*.

### In Review

- Hatcher, J., Rayens, M.K., & Reed, D.B. (2007). Psychometric evaluation of the John Henry self-efficacy scale in a sample of older farmers. Manuscript submitted to *Journal of Nursing Measurement*. August, 2007.
- Privette, C., Garkovich, L., Field, B., & Reed, D. (2007). Perspectives on the persistence of work among African American elderly farmers. *Southern Rural Sociology*
- Reed, D.B., & Westneat, S. (2008). Exposure risks and tetanus immunization status in farmers ages 50 and over. Manuscript submitted to *American Journal of Preventive Medicine*. March, 2008.

### Draft Manuscripts

- Garkovich, L., Reed, D., & Rayens, M.K. (2005 draft). Work patterns of older farmers. Manuscript to be submitted to *Journal of Rural Sociology* or *Journal of Southern Rural Sociology*.
- Rayens, M.K., Hall, L.A., Peden, A.R., Hahn, E.J., Reed, D., Miller, K.H., & Staten, R.R. (2005). Factor structure of the center for epidemiologic studies – depression scale: A study of women across the life span.
- Reed, D.B., Knox, C., & Rayens, M.K. (2007 draft). Definitions of health.

### Presentations

#### International

- Reed, D.B., Rayens, M.K., & Daniel, D. (2003). *How are they faring in the field: First report of a five year study of farmers over 50* (poster). Future of Rural Peoples: Rural Economy, Healthy People, Environment, Rural Communities: Fifth International Symposium, Saskatoon, SK, Canada. October 2003.
- Rayens, M.K., Hall, L.A., Peden, A.R., Hahn, E.J., & Reed, D.B. (2004). *Factor structure of the center for epidemiologic studies – Depression scale: A study of women across the life span*. 15<sup>th</sup> Annual Research Congress of Sigma Theta Tau International, Dublin, Ireland. July 2004.

- Reed, D.B., (2004). *Current perspective on research on health and safety in the USA*. (invited presentation). International seminar on Occupational Health and Safety in Agriculture. University College Dublin. Dublin, Ireland.
- Reed DB, Rayens MK. (2005). *How do older farm residents define good health?* Sigma Theta Tau 16<sup>th</sup> International Nursing Research Congress, Waikoloa, HI, July 13-16, 2005.
- Rayens, M.K. & Reed, D.B. (2007). *Predictors of depressive symptoms in older rural couples: Actor-partner interaction model*. 18<sup>th</sup> Annual Research Congress of Sigma Theta Tau International, Vienna, Austria. July 2007.

### *National*

- McKnight, R.H., & Reed, D.B. (2002). *Issues in aging among agricultural populations*. North American Agromedicine Consortium, San Diego, CA. November 17-19, 2002.
- Garkovich, L., Reed, D.B., McCulloch, M.J., Privette, C., & Fields, B. (2004). *Perspectives on the persistence of work among older farmers*. Rural Sociological Society Annual Meeting, Sacramento, CA. August 2004.
- Reed, D.B., Garkovich, L., Fields, B., & Privette, C. (2004). *Cutting back: Transitioning from farmer to retiree*. 2004 State of the Science Conference, Hershey, PA. October 6-9, 2004.
- Reed, D.B. & Rayens, M.K. (2004). *Farm work, satisfaction, health, and depressive symptoms of farm women*. National Rural Women's Health Conference. Washington, D.C. October 2004.
- McCulloch, B., Erolin, K., & Lassig, S. (2004). *Depression and older farmers: Investigation of the CES-D*. Gerontological Society of America Annual Scientific Meeting. Washington, DC. October 2004.
- Reed, D.B. (2005). *Health and hazards of family farming: Who's at risk and what can we do?* (Invited presentation). University of Michigan, Ann Arbor, MI. March 1, 2005.
- Reed, D.B., Browning, S., Rayens, M., & Westneat, S. (2005). *Injuries among farmers over age 50 in Kentucky and South Carolina*. National Institute for Farm Safety Annual Conference, Wintergreen, VA. June 28, 2005.
- Privette, C., Garkovich, L., Fields, B., & Reed, D. (2005). *Perspectives on the persistence of work among African American elderly farmers* (poster). National Institute for Farm Safety Annual Conference, Wintergreen, VA. June 28, 2005.
- McCulloch, B.J. & Reed, D.B. (2005). *Older farmers: Characteristics of depressive symptomatology*. [part of symposium: Rural mental health: Issues across the lifespan]. The Clock is Ticking for Rural America: A Behavioral Health and Safety Conference. Bloomington, MN. July 2005.
- Garkovich, L., Reed, D.B., & Rayens, M.K. (2005). *Work patterns of older farmers*. Rural Sociological Society annual meeting. Tampa, FL. August 2005.
- Reed, D.B. (2005). *Issues on aging in farming* (2-hr invited presentation). 2005 National AgrAbility Project Training Workshop, Burlington, VT. November 7, 2005.
- Sanker M, Twehues C. (2006). *Effects of working with livestock on farm women* (poster). Southern Nursing Research Society annual conference. Memphis, TN. [Student]
- Reed, D.B. & Rayens, M.K. (2006). *Physical and mental health of older farmers* (poster). Southern Nursing Research Society conference. Atlanta, GA. March 2006.
- Reed, D.B., Rayens, M.K., Westneat, S.C. (2006). *The aging farm workforce: Work organization, health, and social dimensions* (poster). NORA Symposium, Washington, DC, April 19, 2006.
- Reed, D.B. (2007). *Providing health services to aging farmers: A practitioner's perspective*. (Invited presentation). Conference on the aging farm community: Using Current Health and Safety Status to Map Future Action. Indianapolis, IN, March 6, 2007.
- Reed, D. B. & Rayens, M. K. (2007). *Senior farm residents link ability to work to their definition of health*. National Rural Health Association Conference, Anchorage, AK, May 16, 2007.

## State

- Amshoff, S., Reed, D., Claunch, D., Westneat, S., & Rayens, M.K. (2004). *Injury experiences of older farmers* (poster). Kentucky Association for Gerontology Conference, Frankfort, KY. [Student]
- Amshoff, S., Reed, D., Claunch, D., & Westneat, S. (2005). *The ability to work: Self-perceptions of health and work satisfaction in KY and SC male farmers over age 50*. Kentucky Association for Gerontology Conference, Owensboro, KY. [Student]

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### **Inclusion of Children**

No children were involved in this study of older farmers.

### **Materials Available for Other Investigators**

A data set of 1,423 farmers from Kentucky and South Carolina was generated through this study. Information related to physical and mental health conditions, farm work, and injuries was collected. Persons wishing to access the materials or data set should contact the principal investigator, Dr. Deborah B. Reed, at the University of Kentucky.

## Inclusion Enrollment Report

**This report format should NOT be used for data collection from study participants.**

Study Title: \_\_\_\_\_  
 Total Enrollment: \_\_\_\_\_ Protocol Number: \_\_\_\_\_  
 Grant Number: \_\_\_\_\_

<b>PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race</b>				
Ethnic Category	Sex/Gender			Total
	Females	Males	Unknown or Not Reported	
Hispanic or Latino				**
Not Hispanic or Latino				
Unknown (individuals not reporting ethnicity)				
<b>Ethnic Category: Total of All Subjects*</b>				*
<b>Racial Categories</b>				
American Indian/Alaska Native				
Asian				
Native Hawaiian or Other Pacific Islander				
Black or African American				
White				
More Than One Race				
Unknown or Not Reported				
<b>Racial Categories: Total of All Subjects*</b>				*
<b>PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)</b>				
Racial Categories	Females	Males	Unknown or Not Reported	Total
American Indian or Alaska Native				
Asian				
Native Hawaiian or Other Pacific Islander				
Black or African American				
White				
More Than One Race				
Unknown or Not Reported				
<b>Racial Categories: Total of Hispanics or Latinos**</b>				**

\* These totals must agree.  
 \*\* These totals must agree.